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CONTENTS.

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CROONIAN LECTURES on Adaptation and Disease. Delivered at the Royal College of Physicians of London, by J. G. ADAMI, M.D., F.R.S., Temp. Lieut.-Col., C.A.M.C.—Lecture IV.—(*Illustrated*) 35

ORIGINAL ARTICLES.

Purulent Bronchitis. A Study of Cases occurring amongst the British Troops at a Base in France. By J. A. B. HAMMOND, M.B. Lond., Lieutenant, R.A.M.C.; Medical Officer, —— General Hospital; WILLIAM ROLLAND, M.D. Glasg., Captain, R.A.M.C.; Pathologist, —— General Hospital; and T. H. G. SHORE, M.B.Cantab., M.R.C.P.Lond., Lieutenant, R.A.M.C.; Officer in Charge, Mortuary, —— Administrative Area.—(*Illustrated*) 41

Marching Fractures. By A. HOWARD PIRIE, B.Sc., M.D. Edin., Captain, C.A.M.C.—(*Illustrated*) 46

A Universal Extension-splint for Gunshot Fractures of the Upper Limb. By REGINALD WILLIAMS, L.R.C.P. & S.Edin., late Captain, R.A.M.C.; Surgical Specialist, Barnet War Hospital.—(*Illustrated*) 48

On the Treatment of Recent Gunshot Wounds with Bismuth-Iodoform-Paraffin Paste. With Special Reference to Compound Fractures. By L. COLLEDGE, M.B. Cantab., F.R.C.S. Eng., Captain, R.A.M.C. (T.F.); and HAMILTON DRUMMOND, M.B.Durh., F.R.C.S. Edin., Captain, R.A.M.C. (T.F.).—(*Illustrated*) 49

The Hæmoglobin Value of the Blood in Surgical Shock. By V. A. BAINBRIDGE, M.D. Cantab., F.R.C.P. Lond., D.Sc. Lond., Professor of Physiology in the University of London; and H. B. BULLEN, B.A. Cantab. 51

A Device for Insuring Spontaneous Separation of Blood Clot from the Walls of the Containing Vessel. By A. D. GARDNER, M.D. Oxon., F.R.C.S.Eng.—(*Illustrated*) .. 51

A Sebaceous Horn. By OSWALD VEVERS, M.R.C.S., L.R.C.P. Lond., Acting Medical Superintendent, Laverstock House Asylum.—(*Illustrated*) 53

REPORTS AND ANALYTICAL RECORDS FROM THE LANCET LABORATORY.

"Chevalier" Malt Flour 53
Chlorogen 53
Cocoa and Milk Powder (Sweetened) 53
Liquor Unoline 53
Tabloid Halazone (0·004 gramme) 53
(1) "Patent" Groats; (2) "Patent" Barley 54

NEW INVENTIONS.

An Apparatus for the Intravenous Injection of Salvarsan (Dr. M. J. Rowlands).—(*Illustrated*) 54
A Crutch-limb.—(*Illustrated*).... 54

LEADING ARTICLES.

AIR RAID PSYCHOLOGY 55
WAR BREAD 56

ANNOTATIONS.

Mentally Deficient Offenders 57
The Treatment of Sciatica by Application of Strong Hydrochloric Acid 57
A Defence of Hypo-nutrition..... 58
The Parasitology of Pyorrhœa Alveolaris..... 58
Anglo-Saxon Medicine and the Origins of French Surgery..... 58

URBAN VITAL STATISTICS:
English and Welsh Towns..... 66
Scotch Towns 66
Irish Towns 66

SPECIAL ARTICLES.

The Metropolitan Hospitals and the Air Raid..... 59
The Control of Venereal Diseases 60
National Baby Week..... 60
The Services 63

CORRESPONDENCE.

The Lumleian Lectures and Medical Research: the Assessment of the Value of Murmurs (Sir James Mackenzie)..... 61
The Detection of *Entamœba Histolytica* and its Cysts (Dr. R. C. McLean) 63
On Skin grafting (Mr. Thos. H. Kellock) 63
War Heart (Dr. Alfred Howell).. 63
The Causation of Sex (Mr. J. B. Burton)..... 71

THE WAR.

The Casualty List 64
Casualties among the Sons of Medical Men 64
Mentioned in Despatches 64
The Canadian Hospital, Orpington 64
The Depletion of Hospital Staffs 64
King George's Fund for Sailors.. 64

OBITUARY OF THE WAR:
Lewis Emerson Clark, M.D. McGill, Captain, C.A.M.C.... 64
Owen Hairsine, M.R.C.S.Eng., Military Cross, Captain, R.A.M.C.—(*With Portrait*).. 65
Frederick William Henry Davis Harris, M.R.C.S.Eng., Lieut.-Col., R.A.M.C.—(*With Portrait*) 65
Henry Harold Robinson, D.S.O., M.R.C.S. Eng., Captain, R.A.M.C.—(*With Portrait*) 65
Douglas Reid King, M.B., Ch.B.Glasg., Military Cross, Captain, R.A.M.C.—(*With Portrait*) 65
Andrew Victor Honman, M.B., Ch.B.Melb., Major, A.A.M.C. 65

MEDICAL NEWS.

An Indian Civil Medical Service 41
A School of Massage 41
Royal College of Surgeons of England 65
Dublin University Medical School and the War..... 66
Society of Apothecaries of London: Pass-list 67
University of Aberdeen: Installation of the Chancellor and Summer Graduation.—Degrees conferred 67
University of Glasgow: Pass-list 67
Donations and Bequests 67
Anti-mosquito Measures in Calcutta..... 67

OBITUARY.

William George Tottenham Posnett, F.R.C.S.Irel. 68

PARLIAMENTARY INTELLIGENCE.

Notes on Current Topics: Experiments on Living Animals.—Military Service (Review of Exceptions) Act..... 67
House of Commons 69

INDEX.

VOL. I., 1917 ..... iii.-xx.
TITLE-PAGE.
(*See Notice on p. 59.*)

Appointments 70
Vacancies 70
Births, Marriages, and Deaths... 70
Notes, Short Comments, and Answers to Correspondents..... 71
Medical Diary..... 71
Editorial Notices 71
Manager's Notices 71
Meteorological Readings 72
Acknowledgments of Communications received 72

FOR INDEX TO ADVERTISEMENTS SEE PAGE 2.

JOHN BALE, SONS & DANIELSSON, LTD.,
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INDEX

MEDICAL AND OTHER BOOKS AND PUBLICATIONS

PAGE

BAILLIERE, TINDALL & COX:—
Hayes—Intensive Treatment of Syphilis, &c. ..... Cover 1

BALE, SONS & DANIELSSON:—
Cochrane & Sprawson—A Guide to the Use of Tuberculin 1
De Quervain—Clinical Surgical Diagnosis for Students and Practitioners 1
Fantham, Stephens, & Theobald—The Animal Parasites of Man .. 1
Worth—Squint ..... Cover 1

BUTTERWORTH & CO.:—
Brahmachari — Kala-Azar: Its Treatment 7

CHURCHILL, J. & A.:—
Ballard—An Epitome of Mental Disorders 5
Berry, Berry, Bleasc, &c.—A Red Cross Unit in Serbia 5
Craig's Psychological Medicine 5
Davies' Minor Surgery 5
Darling—Surgical Nursing and After-Treatment 5

PAGE

CHURCHILL.—(Continued).
Hull—Surgery in War 5
Lolean—Sanitation in War 5
Marshall — Explosives: their History, Manufacture, Properties and Tests 5
Mennell—Massage 5
Rowlands & Turner's Operations 5
Taylor's Operative Surgery 5
Warren's Text-Book of Surgery 5

DANIEL:—
Rabagliati—Initis or Nutrition and Exercises 7

FROWDE AND HODDER & STOUGHTON:—
Bristow - Treatment of Joint and Muscle Injuries 6
Jones—Injuries of Joints 6
McCann—Cancer of the Womb: its Symptoms, Diagnosis, Prognosis, and Treatment .. Cover 1
Mackenzie, Sir J.—Principles of Diagnosis and Treatment in Heart Affections 6
Nicoll—Dream Psychology Cover 1
Nicoll—Dream Psychology..... 6
Penhallow—Military Surgery 6

PAGE

FROWDE, &c.—(Continued).
Porter—Elements of Hygiene and Public Health 6
Riviere — Pneumothorax Treatment of Pulmonary Tuberculosis 6
Stewart & Evans—Nerve Injuries and their Treatment 6

KIMPTON:—
Roth—Military Orthopædics Cover 1

LONGMANS, GREEN & CO.:—
Watson-Williams—Rhinology Cover 1

MEDICAL PUBLISHING CO.:—
Lane, Sir A.—Operative Treatment of Fractures ..... Cover 1

NISBET & CO.:—
Romer and Creasy—Bonesetting and the Treatment of Painful Joints ..... Cover 1

SAUNDERS COMPANY:—
Albee's Modern Orthopædic Surgery..... Cover 1
Albee—Modern Orthopedic Surgery 3

PAGE

SAUNDERS CO.—(Continued).
Anders—Practice of Medicine 3
Anders and Boston—Medical Diagnosis 3
Bandler—Medical Gynæcology.... 3
Moynihan, Sir B.—Abdominal Operations 3

WRIGHT & SONS (BRISTOL):—
Groves—Modern Methods of Treating Fractures ..... Cover 1
Medical Annual Synoptical Index to Remedies and Diseases 4
The Medical Annual, 1917 4

MEDICAL LIBRARIES, &c.:—
Baker—Books..... 7
Behnke—Stammering, Lisping, & Cleft Palate Speech 7
British, Foreign, and Colonial Corporation—100 Best Investments 6
Ketley—Stammering 7
Lewis & Co.'s Medical and Scientific Circulating Library.. Cover 1
Lewis & Co.'s Medical and Scientific Circulating Library 4
Matthews—Wood: Application of Trusses to Hernia 7

OFFICIAL AND GENERAL ANNOUNCEMENTS

ASSISTANCIES, MEDICAL 51

ASYLUMS, HOMES, &c.:—
Ashwood House, Kingswinford .. 45
Barnwood House Hospital 46
Bishopstone House, Bedford..... 46
Brunton House, Lancaster..... 46
Camberwell House, Peckham-road 47
Carew Building, Bodmin..... 45
Clarence Lodge, Clapham Park .. 46
Coithurst House School, Alderley Edge..... 45
Coppice, The, Nottingham..... 46
Dalrymple House, Rickmansworth 48
Dartmoor Sanatorium 48
David Lewis Colony, Alderley Edge 45
Duff House, Banff 48
Edwards, Leeds..... 45
General Manager, Craven-street.. 45
Ghyllwoods Sanatorium 48
Grove House, Church Stretton .. 46
Grove, The, Catton, Norwich 46
Haslemere Nursing Home..... 45
Haydock Lodge, Newton-le-Willows 47
Homes for Inebriate Women 48
Littleton Hall, Brentwood..... 45
London Fever Hospital..... 46
Malling Place, Kent 43
Melbourne House, Leicester..... 48
Mendip Hills Sanatorium 48
Moat House, Tamworth 48
Newmains Retreat, Lanarkshire.. 47
Nordrach-on-Dee, Banchory 48
Northumberland House, Finsbury Park 45

ASYLUMS—(Continued).
Northwoods House, Winterbourne 47
No. 391, L.C., Strand 45
Nurse Meacock, Hanwell 52
Peckham House 47
Pendyffryn Hall Sanatorium, Nordrach-in-Wales 49
Plympton House, Plympton 48
Portsmouth Corporation Mental Hospital..... 45
St. Andrew's Hospital, Northampton 48
Shaftesbury House, Formby-by-the-Sea 47
Springfield House Private Asylum, Bedford 45
Stonycrest, Hindhead, Surrey..... 47
Stretton House, Church Stretton. 46
The Grange, near Rotherham 48
Vale of Clwyd Sanatorium 49
Warneford Asylum, Oxford 47
Wye House, Buxton 46

FINANCIAL, &c.:—
Equitable Reversionary Interest Society 43

HEALTH RESORTS, BATHS, &c.:—
Caterham Sanitarium 49
Droitwich Brine Baths 49
Smedley's, Matlock..... 49

HOSPITAL, INFIRMARY, SANATORIUM, &c., VACANCIES.. 49-51

HOUSE & ESTATE AGENTS:—
K. A., Hampstead 52

LIFE & FIRE ASSURANCES, &c.:—
Medical Sickness and Accident Society 11
Prudential 43

MEDICAL ACCOUNTANTS, &c.:—
Turner 52

MEDICAL AGENTS:—
Arnold & Sons, Giltspur-street .. 51
Fieldhall, Limited 51
Manchester Clerical, &c., Assoc.. 53
Medical Agency 53
Needes, J. C. 53
Peacock & Hadley 53
Turner 53

MEDICAL SCHOOLS.—
(LONDON.)
London School of Clinical Med. .. 42
St. Mary's Hos. Medical School 43
West London Post-Graduate Coll. 42
(PROVINCIAL, &c.)
University of Birmingham 43
University of Sheffield 42

NURSES' ASSOCIATIONS:—
Co-operation of Temperance Male and Female Nurses 44
Female Nurses Association 44
General Nursing Association 45
Hospital for Sick Children..... 45
London Nurses' Association 44
London Temperance Nurses Co-operation 43

NURSES' ASSOC. (Continued).
Mental Nurses Association 44
Mental Nurses' Co-operation..... 45
Misses Strongwick's Nursing Agency 45
New Mental Nurses' Co-operation 45
Nurses' Association 44
Nurses' Co-operation 44
St. John's House 45
St. Luke's Hospital 45
Temperance Association of Male Nurses, Ltd..... 44
The Retreat, York 44

OFFICIAL NOTICES:—
City of London Lying-in Hospital 42
Incorporated Society of Trained Masseuses 42
Institute of Massage and Remedial Gymnastics 43
London School of Tropical Medicine 42
Queen Charlotte's Lying-in Hospital 42
York-road General Lying-in Hos.. 42

PARTNERSHIPS & PRACTICES. 51

RAILWAY & STEAMSHIP CO.'S.:—
Royal Mail Steam Packet Co. 45

TUTORS & LECTURERS:—
Behnke—Stammering, &c..... 43
Medical Correspondence College. 43
Weymouth 43

TRADE AND MISCELLANEOUS ADVERTISEMENTS

AMBULANCES:—
St. John Ambulance—
Invalid Carriages..... 9

ANATOMICAL MECHANICIANS:—
Grossmith's Artificial Legs, Arms, Hands, and Eyes 8

BOTTLE MERCHANTS:—
Isaacs 41

CARRIAGES, MOTORS, &c.:—
Armstrong—
Chauffeurs', Coachmen's, Footmen's Liveries 52
Beldam Tyre Co., Ltd.—
Bulldog Tyres 9
Offord & Sons—Ford Cars 9
Singer & Co., Ltd.—Singer "10" Doctor's Car 9

CHEMISTS & DRUGGISTS:—
Allen & Hanburys—
Allenburys Castor Oil 36
Argein, Kavol, Cystazol 21
Byno Lecithin, &c. 22
Anglo French Drug Co.—
Ambrite, Kinectine, &c. 29
Battley & Watts—
Liquor Opii Sedativus 35
Boots Pure Drug Co.—
Chloramine-T 19
Chloramine-T Gauze 19
Browning & Co.—Semprolin Emulsion with Iron ..... Cover iii
British Organotherapy Co., Ltd.—
Lymphoid Compound 15
British Oxygen Co.—Oxygen 36
Burroughs Wellcome & Co.—
Lubafax, Borofax, Phenafax.... 27
Christy & Co.—Ergoapiol 32
Clay, Paget & Co.—
Glycolactophos 36
Clin Laboratories—
Electric Colloidal Metals 30
Evans Sons Lescher & Webb—
Sera, Vaccines, Tuberculins, &c. 29
Capsul. Ol. Santal. Flav..... 20

PAGE

CHEMISTS.—(Continued).
Ferbe Ltd.—Bienosan Capsules.. 37
Fletcher, Fletcher & Co.—Vibrona 28
Gale & Co.—Sugonum, Entrapuro, Syrup. Glycerophosphatum 39
Genatosan, Ltd.—Sanatogen..... 38
Heppelle—
Urodonal, Jubol, Globeol, &c. .. 18
Hewlett & Son—
Mist. Pepsinæ Co. c. Bismutho.. 38
Hogg & Son—Protein Nerve Food 51
Hough, Hoseason & Co.—Hydrion 40
Hudson's Eumenthol Chemical Co.—Eumenthol Tooth Powder. 39
Humphrey Taylor & Co.—
Junora 32
Lawson & Co.—Anti Fly Products 40
Mertens — Electrargol, Enesol, &c. 30
Moore & Co., Ltd.—
Lymm-Pure-Salt 40
Parke, Davis & Co.—Pituitrin.... 24
Price's Patent Candle Co., Ltd.—
Price's Night Lights 40
Raimes & Co.—Slinger's Nutrient Suppositories 41
Smith & Co.—Hall's Wine..... 38
Tidman's Sea Salt 36
Virol Research Laboratories—
Clinical Pathology and Research 14
Wilcox, Jozeau & Co.—
Nativelle's Crystallised Digitaline 32
Riodine 32

DISINFECTANTS:—
Bowley & Son—Vermijelt, &c. .. 39
Condy's Fluid..... 8
Quibell Bros.—Kerol 37
Sanitas Co.—
Sanitas Fluid, &c. 30

FOODS—
Allen & Hanburys—
Allenburys Foods 23
Aylesbury Dairy Co.—
Humanized Milk 41

PAGE

FOODS—(Continued).
Benger's Food ..... Cover iv
Blatchley's Diabetic Preparations 41
Chymol Company—Chymol 31
Carnrick & Co.—Liquid Peptonoids, Soluble Food 25
Freemans Devonshire Custard.... 51
Glaxo 15
Hommel's Hæmatogen 54
Nestlé's Milk 16
Thew, Hooker & Gilbey, Ltd.—
Malted Milk 41
Valentine's Meat-Juice .. Cover ii
Van Houten's Cocoa.....Cover iii
Vitamogen Ltd.—Vitamogen 35

FURNITURE, &c.:—
Carters—Furniture for Invalids and Hospital Supplies 10

HOSPITALS (ISOLATION):—
Humphreys, Limited—
Mobile Hospital Buildings, &c.. 35

MED. & SURG. APPLIANCES:—
Arnold & Sons—New Patent Phonophore Stethoscopes 12
Bailey & Son—Trusses 15
Davis—Lukens Sterile Catgut with Dulox Needle..... 8
Davis & Geck—
Kalmerid Catgut 53
Down Bros.—
Finochietto's Extension Stirrup 7
Hoefticke—
Extension Appliances 28
Hough, Hoseason & Co.—
New Century Urethral Syringe. 40
Leslies, Ltd.—
Leslies' Zopla ..... Cover ii
Macfarlan & Co.—
Surgical Catgut 34
Millikin & Lawley—
Osteology, &c..... 9
Robinson & Sons—Gamgee Tissue 8
St. Dalmas & Co.—
Leicester Varico Leg Bandage .. 12

PAGE

MED. APPLIANCES—(Continued).
Timpson & Co.—Ligatures..... 34
Wormull—System of Aluminium Splinting ..... Cover ii

MINERAL WATERS, &c.:—
Davis & Davis—Natural Mineral Waters 41
Salutaris 17
Vichy-Célestins 54

OPTICIANS:
Bausch & Lomb Optical Co.—
Microscopes..... 9
Watson & Sons, Ltd.—
Microscopes 9

SANITARY APPLIANCES, &c.:—
Mechan's Patent Sanitary Destructor 11

STATIONERY, &c.:—
Anderson & Son—
Doctors' A/c Forms, &c. 52

TAILORS, BOOTMAKERS, &c.:—
Dowie & Marshall—
Hygienic Bootmakers 34
Evans & Co.—
Service Uniforms, &c. 8
Harry Hall—Service Dress 52

VACCINE LYMPH:—
Chaumier's Calf Lymph 34
Renner's Calf Lymph Establishment 34

WINES, BEER, SPIRITS, &c.:—
Humphrey Taylor & Co.—
"G. B." Diabetes Whisky 32

X-RAY, &c., APPARATUS:—
Medical Supply Association—
Kompact X-Ray Installation .. 10

MISCELLANEOUS:—
National Health Society—Educated Women wanted 51

Croonian Lectures

ON

ADAPTATION AND DISEASE.

Delivered at the Royal College of Physicians of London,

BY J. G. ADAMI, M.D., F.R.S.,

TEMPORARY LIEUTENANT-COLONEL, C.A.M.C.

LECTURE IV.*

Delivered on June 26th, 1917.

THE PHYSICO-CHEMICAL BASIS OF IMMUNITY AND OF EVOLUTION.

MR. PRESIDENT AND GENTLEMEN,—If we endeavour now to gather together the conclusions which may reasonably be reached from a consideration of the data afforded in the last two lectures they appear to be the following.

CONCLUSIONS FROM DATA ALREADY GIVEN.

I. Instead of there being no such thing as direct adaptation or equilibration of the individual to his surroundings in the Spencerian sense, this surely exists and can be demonstrated.

II. In the lowest forms of life, among the bacteria, it can be demonstrated that not only in this adaptation individual but that acquired properties of certain orders are inherited through numerous generations, even when the cause which set up the original modification has ceased to act.

III. It can further be demonstrated that the inheritance is not due to the survival and perpetuation of those individuals only which present the favourable variation. All the members of a given strain of bacteria subjected to a given modification of environment can be made to vary in the same direction and acquire and transmit the same new property.

IV. Immunisation of the higher animals is direct adaptation. There could, in fact, be no clearer demonstration of the process of direct adaptation than has been afforded by the abundant researches upon the production of immunity.

V. It is clearly proved that there are drugs and toxins which, acting on the tissues of the body, act also on the germ cells, causing modification of the latter of such a nature that the offspring resulting from these germ cells is modified.

VI. The clearest evidences of this action are in connexion with drugs and toxins which lead to conditions of defect, but acquired special susceptibility and anaphylactic reaction are also inherited, indications that new properties gained by the germ cells can also be inherited.

VII. The generative system is embryogenetically related to the endocrine system, and is profoundly influenced by the internal secretions of that system. The indications are that influences from without affecting the organs of internal secretion and modifying their secretions may, through the hormones, &c., of the internal secretions, so influence the germ cells that the offspring are affected in the same direction as the parent, and that thus acquired metabolic disturbances in the parent, whether of the nature of defects or acquirements, are capable of being inherited.

To the academic biologist the suggestion of a direct action of external agencies as the prime cause of variation is as shocking and as improper as would be the suggestion of a *risqué* story to some dear and prim old maiden lady. To the biologist of to-day the conclusions above noted are heterodoxy pure and simple. And yet it is along these lines that medical research is surely leading us. And what is more, these conclusions harmonise with the experiences that come to us day after day in studying our patients and their families.

WEAKNESS OF THE MORPHOLOGICAL CONCEPT.

Believing that we are in the right, where is it that the biologists have gone wrong?

I venture to suggest that, from the morphological trend of their studies, in striving to form a mental picture of the process of evolution biologists have perforce conjured up separate individual particles or molecular structures, each of which is the bearer of an individual property or group of properties. Their conceptions have perforce been in the terms of specific atomies.

We see this tendency elaborated—and, in his great sanity, cast aside—by Charles Darwin in his pangenesis hypothesis. It was exhibited again *à merveille* by Weismann with his ids, idants, determinants, and the like, pure figments of the imagination which, nevertheless, have influenced and affected all our generation. It has shown itself and been carried forward in full vigour by the Mendelians: one has only to consult their diagrams to see how obviously their conceptions and explanations assume a structural form. It is because he cannot picture in his mind an atomy, or structure, making its appearance in the germ cell, like Venus arising out of the sea foam, and henceforth becoming a portion of the hereditable substance of that cell, that Professor Bateson finds it impossible to imagine the positive acquirement of new properties by the individual, and so is driven to the remarkable hypothesis quoted in my first lecture.

But before all it is the Freiburg philosopher who has led our generation of biologists into Nephelococcygia—"Cloud Cuckoo-land." Much as we owe to him for arresting the vague generalisations upon heredity prevalent until the "eighties," and for his confirmation, experimental and otherwise, of Galton's doctrine that conditions such as mutilations and use acquirements are not inherited, I myself am inclined to think that Weismann's teaching has, on the whole, done more harm than good. He was a pure morphologist, and his hypothesis was purely morphological. Had he been familiar with the physical chemistry of his day he could not have ventured to publish it; had he been a physiologist with any appreciation of function he must have modified it extensively. It is, in short, an impossible hypothesis, and in a very extraordinary manner all its main postulates are found contrary to experience. As I pointed out nine years ago,[1] our knowledge of the size of the molecule of albuminous matter renders the existence of thousands of individual molecular determinants in the minuter portions of the nucleus a matter of sheer impossibility—they could not be packed in the space. If I remember aright, it was Herbert Spencer who pointed out that in one feather of the peacock's tail there are 480,000 regions or parts capable of independent variation, and that, therefore, so Weismannism demands, in each of the many microscopic "ids," or chromosomes, in the nuclear chromatin of the peahen's ovum there must be 480,000 determinants for each tail feather alone. How many for the rest of the body passes computation!

It is this faulty and untenable morphous or morphological concept of unit-properties and hereditary entities that makes it as difficult for Professor Bateson to picture how new accretions (whereby he images new discrete determinants) can make their appearance in the germ cell as it was for King George of glorious memory and muddled to imagine how the apple got into the dumpling.

THE CONSTITUTION OF LIVING MATTER.

Suppose now we start instead from known facts and known phenomena, and endeavour upon these to build up our idea of the structure and nature of the germ cell, and so of the organic basis of heredity, variation, and evolution.

What in the first place do we know of the constitution of living matter? Will this help us? I think it will. We know that whatever form of life we investigate, be it in animal or plant, mammoth or microbe, whatever form we analyse, and whatever tissue of that form we analyse, leaving out of account water and certain common vehicular salts to which no specific vital functions can be attributed, just one order of highly complex organic compounds is common to, and to be isolated from, all forms of living beings, and these are the proteins. This characteristic universal presence of these highly complex organic compounds in itself indicates that they are intimately associated with vital functions. It is true that when we isolate them chemically they are inert—in other words, in the living organism with its many activities they are evidently present in another form; living matter, therefore, as I have expressed it elsewhere, contains as an essential constituent *protcidogenous* rather than proteid matter.

The Structure of the Proteins.

But the structure of these proteins, as worked out first by Curtius and Schutzenberger, and as more fully demonstrated

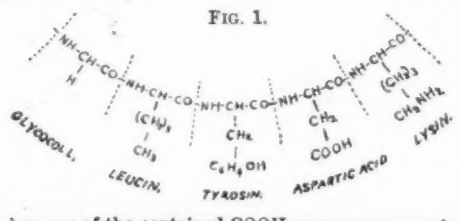
* The previous lectures were briefly summarised in THE LANCET, I., 1917, i., 921; II., 1917, i., 961; III., 1917, ii., 20.

[1] Adami, Principles of Pathology, vol. i., first edition, 1908.

by Emil Fischer through the actual synthesis and building up of bodies of protein nature in the laboratory, is highly significant. They are molecules so large that they will not pass through fine filters, giant molecules but a little below the limit of visibility under the highest powers of the microscope. Take one of the simpler crystallisable proteins—namely, hæmoglobin; its composition appears to be approximately $C_{712}H_{1130}N_{214}O_{218}Fe_4S_3$; in fact, the average molecular weight of proteins has been estimated at about 15,000, or roughly one thousand times that of a molecule of water. And the hæmoglobin from each species of vertebrate is a different chemical substance: nay more, our researches in immunity indicate that there may be differences between the hæmoglobins of two members of the same family. Certainly, no two analyses of separate samples of crystalline hæmoglobin obtained from the same species give identical results. By digestion, as every board-school child knows, we break these proteins down into peptones and albumoses. By further disintegration Kossel and others have broken down these peptones and protones into their constituent amino-acids, bodies belonging to the fatty acid series—aminated fatty acids. What Fischer has done has been to manufacture these aminated fatty acids (acetic, propionic, &c.) in the laboratory, and then he has accomplished the reverse process of linking these together, until with five, ten, fifteen, and more linked together he has obtained bodies affording the chemical tests for peptones.

Now these amino-acids have one striking property—they are amphoteric: they possess both acid and basic properties:

FIG. 1.



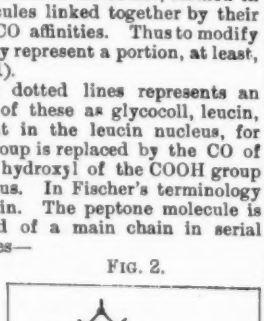
acid, because of the contained COOH group or groups, basic, through the NH_2 group or groups. Thus we conceive these peptones as composed of polymerised molecules, formed in the main of amino-acid molecules linked together by their otherwise unsatisfied NH and CO affinities. Thus to modify Hofmeister's illustration we may represent a portion, at least, of the peptone molecule (Fig. 1).

Each section between the dotted lines represents an amino-acid nucleus. I speak of these as glycocoll, leucin, &c., but it will be seen that in the leucin nucleus, for example, an H of the NH_2 group is replaced by the CO of the glycocoll nucleus, and the hydroxyl of the COOH group by the NH of the tyrosin nucleus. In Fischer's terminology the nucleus is leucyl, not leucin. The peptone molecule is thus represented as composed of a main chain in serial repetition of glycocoll molecules—

(H) – NH.CH.CO – (OH)
|
(H)

in which the NH affinity on the one side and the CO on the other have been satisfied by linkage with a like molecule, while one H of the CH_2 is substituted (in the figure) by methyl-para-oxybenzene, acetic acid and butylamin. We have, that is to say, a main glycocoll chain with a series of free-swinging chains capable of being replaced or modified by processes of oxidation or the action of enzymes.[2]

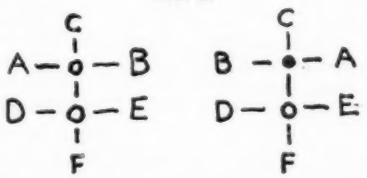
FIG. 2.



The Complexity of the Proteins.

But the complex protein is composed of, and breaks down into, peptones. We can therefore represent it either as a chain or a ring of linked peptone molecules, or simply, as in Fig. 2, in which the hexagons A to F represent each a peptone nucleus with its ring of glycocoll nuclei, with, however, the "swinging side-chains," as I have termed them, indicated as in the main unsatisfied, save at M, M, M and H. This represents but the central skeleton of the protein molecule, a frame in which to place one's mental picture of its nature and complexity. Imagine that complexity when in the hæmoglobin molecule, for example, there is somewhere inserted among the 700 or so carbon atoms just one atom of sulphur and two of iron. The nuclei or radicles of which these are essential constituents must have one particular place among the other nuclei composing the ring or chain. Consider also the number of vulnerable linkages—free swinging side-chains that may be detached by compounds in the neighbourhood having stronger affinities and be replaced by others, thus altering the constitution of the protein molecule as a whole. In the much simpler bodies with which the organic chemist is in the main concerned — bodies, for example, like those of the benzole derivatives or the carbohydrates —we know how the transfer of a given radicle form, say, from the alpha to the delta position upon a ring brings about profound change in the chemical and physical properties of the compounds. Bodies, for example, of identical molecular weight, which on analysis contain the same number of atoms of carbon, hydrogen and oxygen, and on analysis afford identical radicles, may be found to differ to a remarkable degree. As Bayliss points out, when two carbon atoms are united together there are, or may be, six free affinities, and when these are satisfied by six different univalent groups, 12 different arrangements are possible.[3] (Fig. 3.)

FIG. 3.



Even if for the time we leave out all consideration of introduction of new orders of "swinging side-chains," think of the number of permutations and combinations that are possible when instead of two there are in the ordinary protein molecule hundreds of carbon atoms.

The Biophores.

If, therefore, we regard the biophores, or molecules of living and heritable matter in the germ cells as, if not proteins, at least proteidogenous, giving rise to proteins when dead or killed in the process of analysis, obviously it is not necessary to demand a separate determinant, a separate molecule for each specific property, it is simpler to regard properties inherent in the biophores as the expression of the constitution of those biophores, of the mode of linkage of the various nuclei, together with the number of those nuclei and the nature of their swinging side-chains. This conception is within the bounds of physical possibility, and Weismann's ids, idants, determinants, and the like, certainly are not.

Let us therefore accept as a working hypothesis this conception of the chemical constitution of the essential living matter of the individual—namely, that it is, as I express it, proteidogenous, giving upon analysis bodies of proteid nature, and that these biophores or molecules endowed with vital and heritable properties are composed of rings, or it may be chains of amino-acid nuclei in series, each nucleus composed of a central amphoteric glycocoll group to which are attached varying orders of side-chains.

We know, in the first place, that in conjugation or amphimixis, the one element of the two germ cells, male and female, that is contributed in approximately equal portions is the nuclear chromatin. We cannot help being impressed by the extraordinary sequence of events all tending to this end result. No other element common to the two germ cells is partitioned out so meticulously. There is no other element common to the two cells that is doled out with the same equivalence. Next, making a careful survey of heritable and inherited properties, we are forced to the conclusion that the likelihood is equal, that the offspring

[2] So as not to introduce complications I have here purposely left out of account a consideration of the relationship of the purin nuclei or radicles to such chains; it is necessary, however to keep in mind that the latter are important constituents of the nuclear matter and of what later I shall refer to as the biophores.

[3] Principles of Physiology, p. 285.

inherits either from the male or from the female parent. The conclusion is inevitable that the biophoric molecules are conveyed in and by the nuclear chromatin. In the bacteria which are so lowly that they possess no central nucleus, we observe, nevertheless, that chromatin-like granules are scattered through the body substance, and that in binary division these chromatin-like granules undergo a certain simple accumulation or arrangement, to the end that each of the daughter cells is endowed with half of this specific chromatin-like material.

FIG. 4.

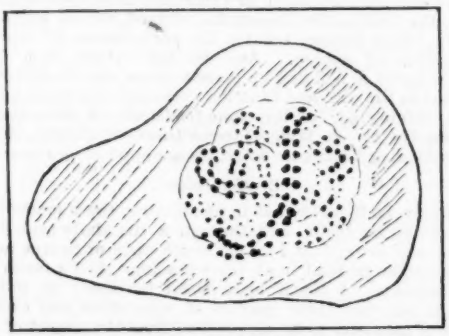


Diagram of cell showing beginning of nuclear mitosis: "skein" stage, the thread formed of a double beaded row. Each bead is one of the "chromomeres" referred to in the text (Weismann's "ids.")

Or otherwise, whereas in these lowest forms the living cell substance is made up of granules of chromatin, each surrounded by an area of cytoplasm, higher up in the scale these granules of biophoric matter are collected into a central node—the nucleus—which is separated from the circumambient external medium by the cytoplasm or cell-body. We may, indeed, speak of a triple protection—namely, the cell-wall or membrane, the cytoplasm, and the nuclear membrane, all of them, on the whole, acting as conservative agents, tending to preserve the biophores from sudden change from without. (Fig. 4.)

Vital Processes of the Cell.

But to continue, as it were, to rehearse our catechism, while on the whole conservative, this system is exposed to constant change, owing to the fact that it is not inert but is constantly reacting with that external medium, receiving matter from the same either (1) in bulk (phagocytosis), or (2) by diffusion, or (3) by surface absorption, and discharging other matter into the same (excretion). And if we study carefully these processes of assimilation and discharge it is to be made out that the outer cell membrane is semi-permeable, preventing the entrance of certain substances, permitting the entrance of others, whether directly, or after a preliminary dissociation of the same into simpler molecules by means of its extracellular secretions. And once these foodstuffs are taken into the cytoplasm, there again they are, if necessary, broken down still further into yet simpler molecules by intracellular enzyme action.

It is being more and more surely established that these enzymes are of nuclear origin, resulting from the discharge of certain constituents from the nuclear substance, but this is not a necessary part of my argument. The essential point is that the foodstuffs, protein, carbohydrate, and hydrocarbon are not utilised by the cell as such, but are dissociated, and it is these disintegrated and dissociated molecules that are utilised by the cell in one of two ways—either to supply energy for the performance of work or, on the other hand, for growth.

The Nature of Growth.

I feel almost apologetic for taking up time over such elementary matters. And yet these are matters that, while absolutely basal, are absolutely neglected by ordinary biologists. Take, for example, this matter of growth. With all the extraordinary width of his learning D'Arcy Thompson has just achieved a work of some 750 octavo pages on "Growth and Form," full of most interesting observations and data, and with a distinction of style that is a pure delight, but with little more than a page devoted to the essential nature of growth of living matter, and that page upon the text that the older naturalists laid stress upon the fact or statement that inorganic bodies (crystals) grow by agglutination, organic bodies by intussusception. The living cell, he states,[4] grows very much as a piece of glue swells up in water, by "imbibition" or by interpenetration into and throughout its entire substance. From his statement growth might be nothing beyond the absorption of water by a semi-fluid colloid mass. Now one has only to consider a moment to see that "intussusception," "imbibition," "intercalation" are nothing more than bald and blank terms. They are inane; they cannot possibly explain how two molecules of living matter appear where there was but one before, two grains of wheat where one was put into the ground. Growth is one of the great underlying phenomena of living matter, and zoologists and botanists have in a simple Topsy-like manner been satisfied that the phenomenon occurs, and have been amply content to rest with the demonstration of the stages of mitosis and cell division.

But what has happened to the cell substance that precedes and impels mitosis? Obviously there is an increase in the amount of living matter, and this translated into physical terms means a multiplication of the molecules of living matter, or, as I term them, the biophores or biophoric molecules.[5] If we regard these complex proteidogenous molecules as a chain, or more simply as a ring of amino-acid radicles, there is but one way in which this can multiply—namely, by the same method as obtains in the growth of a crystal. Let us take the simplest case, that of the crystallisation of sodium chloride out of watery solution. We know that when the solution or dilution of the sodium chloride reaches a certain point the salt separates into its constituent ions of sodium and chlorine. But while separated these maintain a certain relationship or association. It is remarkable that the chlorine ions do not escape or volatilise into the air. When the concentration of the solution reaches a certain point each ion of chlorine unites with a corresponding ion of sodium, and, aided by a sharp point or inequality of the surface of the containing vessel, the process of crystallisation begins. The very existence of one crystal is seen to cause other junctions to occur in its immediate neighbourhood, and, indeed, just that one series of junctions necessary to form sodium chloride. Despite the presence of other salts in solution, we gain pure, or almost pure, crystals of the one substance. We have in this way growth of solid sodium chloride.

Growth of living matter, if more complicated, because the structure of the biophores is more complicated, must nevertheless be of the same order. Its nature is best suggested by the following diagram:—

FIG. 5.

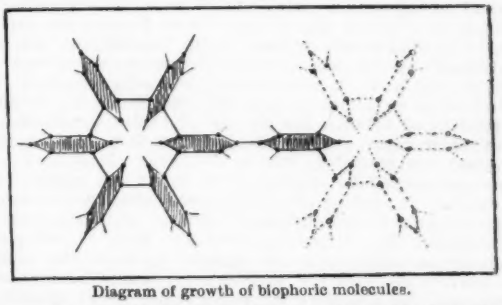


Diagram of growth of biophoric molecules.

—namely, granted that the already existing biophore finds itself in a medium—the nuclear cell sap—containing the necessary radicles, should that by one of its attachments attract to itself one of its component radicles there is then started a process by which, in orderly sequence, the other radicles become attached until there is built up a compound molecule, identical with the pre-existing molecule, in association with which it has become developed.

This conception—namely, that the growth of the biophores or otherwise of the molecules of living matter is essentially of the same nature as is that of crystals—is materially aided by the recognition that crystallisation does not of necessity demand the production of rigid rectilinear figures; that, as

[4] Growth and Form, Cambridge University Press, 1917, p. 203.

[5] I employ this term, introduced by Weismann, rather than manufacture a new term, because our fundamental conception is identical, although it is necessary to point out that our ideas as to the constitution of the biophores do not entirely harmonise.

Lehmann[6] was the first to point out in 1904, there are in nature abundant examples of fluid, non-rigid, crystalline forms, and as Aschoff and I were the first to note[7] in 1906 the animal organism affords abundant examples of these fluid crystals. As D'Arcy Thompson well remarks,[8] "the phenomenon of liquid crystallisation does not destroy the distinction between crystallisation and colloidal forms, but gives added unity and continuity to the whole series of phenomena."

REVIEW OF SOME CONCLUSIONS LED TO.

But if we accept these views regarding the existence of biophoric molecules and the essential nature of growth as involving a multiplication of the same by a process akin to crystallisation, we are inevitably led to certain very interesting conclusions which may here be rapidly passed in review. Each, it is true, might well be expanded into a chapter, but the limitations set by this course of lectures demands that I do little beyond indicating the headings.

1. *The Continuity of the Germ Plasm.*

Weismann conceives his biophores and determinants as handed down direct from parent to offspring, so that the germ plasm of a thousand generations back is contained in the germ cells of the generation of to-day and has its influence upon the configuration of the body of the individual derived from those germ cells. This he speaks of as the continuity of the germ plasm.

But, obviously, this is not a continuity of substance, as Weismann implies, but merely a potential continuity of molecular arrangement and constitution. For growth and multiplication of the living molecules, for one conjugated ovum and spermatozoon to give rise to the countless millions of sperm cells of the male of any of the higher animals[9] there must be such active reproduction of the parental biophores that the chance of one of the original biophores of a grandparent finding itself in the nucleus of a sperm cell must be infinitesimal. The likelihood is that while such, it is true, control the constitution of the new biophores they sooner or later, in the metabolic processes of the cell, become dissociated and broken down.

2. *On the Functional (Katabiotic) and Vegetative (Bioplastic) Activities of the Cell and the Individual.*

In unicellular organisms the growth of the individual presents itself merely as increase in size; in multicellular organisms, while there may be increase in size of the component cells to a certain extent, growth is brought about in the main by cell proliferation and increase in the number of the component cells. But both in protozoa and metazoa (and protophyta and metaphyta, if the terms be permissible) there are limits to this process. Here I would but rapidly refer to what constitute these limits—namely, they are conditioned by the relationship or interaction between the individual and its environment. Broadly speaking, the individual continues to grow until an economical mean is established between the amount of foodstuffs afforded by the environment and the absorptive surface that the individual can present to that environment. It is, as I have pointed out, a false conception to regard the multicellular organism as a colony of individual cells which remain united for self-defence and mutual advantage. Rather it must be recognised that where the unicellular mass of protoplasm undergoes enlargement the greater the mass the smaller relatively becomes the surface area, and this diminution proceeds in a rapidly increasing ratio, until growth is arrested by the fact that the amount of foodstuffs absorbed cannot keep pace with the needs of the organism. Nuclear and cell division and multicellularity constitute the simplest mechanism whereby the nuclear and cell surface areas can be increased in a yet greater ratio, and the greatest effective working of the individual obtained by decentralisation; whereby we may regard the mass or size attained by the mature individual of any species as representing the sum total of protoplasmic matter of the constitution peculiar to that species, which is capable of existing as an entity under the particular conditions of its environment, the multicellular individual acquiring its greater size and more complex activities by means of nuclear followed by cell division.

In either case, whether in the unicellular or in the multicellular organism, the individual continues to grow and exhibit predominantly vegetative activities until it reaches this limit of economical relationship between itself and its environment. In the very earliest stages the vegetative activities alone are evident; as the above-mentioned limit is approached these become less and less, and the cells are more and more engaged in functional activities—that is to say, they utilise the foodstuffs received, not in building up more living matter, but for the performance of work and liberation of energy. And to the extent that growth necessitates a building-up process from the foodstuffs presented to the cell, and function necessitates a breaking down and burning up[10] of the same foodstuffs, to this extent the vegetative or—as Weigert terms them—bioplastic, and the functional or katabiotic activities are opposed processes.

3. *Metabolism.*

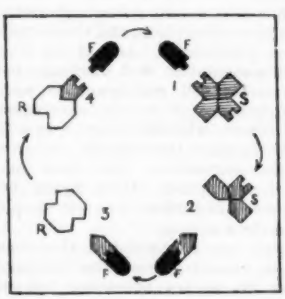
It may be thought that in mentioning these matters I am wandering far afield, and through a singularly arid field at that—nay more, that I do but touch upon or outline matters which to be grasped in all their bearings need a much fuller presentation. I touch upon them purposely in order to emphasise that these matters of adaptation and evolution have of necessity to be approached from the aspect of function and the dynamics of living matter, rather than from the point of cell statics. "Function," it has been said, "precedes structure," and it is the study of cell function that must afford the key.

If next we proceed to inquire into the state of our knowledge of the chemistry of these active processes occurring within the cell we reach a further stage, for the more we study the processes of absorption of food and utilisation of the same—the metabolic processes, whether, as Gaskell termed them, of anabolism, building up, or katabolism, breaking down—the more it is borne in upon us that the greater number—some would say all—are the outcome of enzyme action.

4. *On Enzyme Action.*

This is not the place to discuss the nature of enzyme action in detail. For the most authoritative reading upon the subject Professor Bayliss's works should be consulted. Suffice it to say that the simplest and now generally accepted view is that there exist in the cell and are discharged from it intermediary bodies—katalysts—which promote and hasten chemical dissociations and associations without themselves being involved in the final stage, and that the simplest diagrammatic representation of their action is as indicated in the diagram (Fig. 6), in which F represents the go-between, the body endowed with enzyme action, S the substratum, or body which undergoes dissociation, and R the receptor, or body which is aggrandised, with which the dissociated moiety or part of the substratum enters into union. There are, I hold, always these two phases of dissociation and association in each instance of ferment activity, even if R be but a hydrogen or hydroxyl ion. The process is comparable with the katalytic process of manufacture of concentrated sulphuric acid from sulphurous anhydride, through the agency of nitrous acid. The nitrous acid, HNO_2, takes up a molecule of O from the air, becoming nitric acid, and, acting as carrier, gives this over to the sulphurous anhydride H_2SO_3, converting this into sulphuric acid H_2SO_4, with this becoming free itself to take up another molecule of oxygen and repeat the process with another molecule of

FIG. 6.



[6] O. Lehmann: Flüssige Crystalle. Leipzig, 1904.

[7] Adami and Aschoff: Proc. Royal Soc. B., 1906, 359; Adami: The Myelius and Potential Fluid Crystals of the Organisation. Harvey Lectures, second series, 1908, 117; and Aschoff: Verhandl. deutsch. pathol. Gesellsch., 10, 1907, 166.

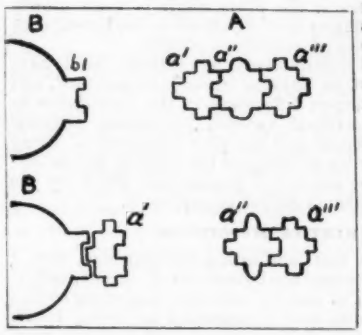
[8] Loc. cit., p. 204.

[9] According to Loeb the average seminal ejaculation in man contains 226,000,000 sperm cells.

[10] It is not (as one is apt to imagine) the dissociation of the foodstuffs that liberates energy, but the burning up of the same—i.e., the oxidation of the dissociated foodstuffs.

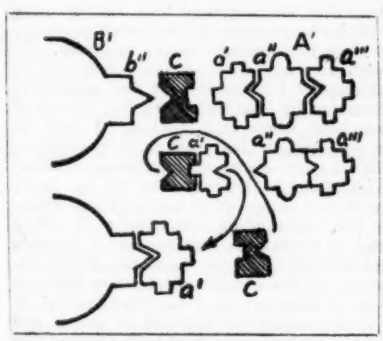
sulphuric anhydride. And the process continues until a certain equilibrium is reached between the amount of anhydride and of sulphuric acid present, unless the H_2SO_4 be removed so soon as formed, in which case eventually a trace of nitrous acid can convert a maximum, or theoretically infinite, amount of anhydride. And this action is, under certain conditions, reversible.

FIG. 7.



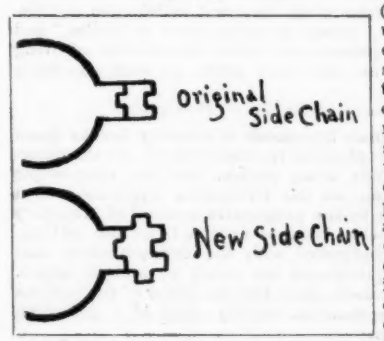
Now, as I have already stated, the evidence is conclusive that none of the ordinary foodstuffs—the proteins, carbohydrates and fats, are utilised by the living cell as such; through enzyme action, whether extracellular or intracellular, they are broken down into simpler substances, into their component radicles. The evidence is accumulating yearly more and more that, if not the enzymes themselves, at least the zymogens, the bodies from which the enzymes are derived, originate in, and are discharged from the nucleus, the dynamic centre of the cell. Already there is evidence that certain of the amino-acids, and it may well be of groups of conjugated amino-acids, constituting Fischer's polypeptids, manifest enzyme action. Their amphoteric constitution in itself favours the possession of these properties.

FIG. 8.



We can visualise the process thus: Let A (Fig. 7) represent a peptone or polypeptid molecule of foodstuff small enough to be absorbed or diffused from the external medium into the cytoplasm of the cell. This may either (1) be broken down into simpler radicles, a' a'' a''', and those radicles utilised by a direct dissociation process for the growth of the proteins of the cytoplasm or, it may be, the nuclear biophoric molecules themselves (B), through an unsatisfied linkage exercising a stronger attraction for certain of the constituent radicles of A, such as a', in which case a' becomes part and parcel of B and a'' and a''', whether combined or loosened, are left free in the cytoplasm; or (2) where the conformation (that is to say, constitution) of A and of B (or better A' and B', Fig. 8) is not such as to permit of this direct attraction and linkage, it may happen that free radicles suspended in the cytoplasm may possess the necessary linkage, and in that case these will act as catalysts or enzymes, first attracting away to radicle a' from A', and then in turn by superior attraction being impelled to give it up to satisfy the linkage b'' of B'.

FIG. 9.



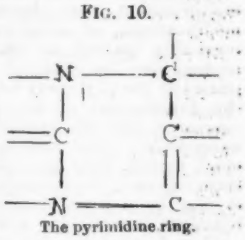
5. *Possibilities Arising out of Above View of Enzyme Action.*

But if this conception and visualisation of enzyme action approaches the fact, do you see where it leads us? I am not going to take up all the lines of thought and possibilities opened up by this conception, but only those bearing directly on my theme.

(1) In the first place the remains of A left free in the cytoplasm, if of amphoteric type, may in itself act as a catalyst.

(2) In the second we are given an understanding of the mechanism whereby foreign proteins may be utilised by the cell. Those proteins are complexes with multiple linkages: they are composed of combinations of the various amino-acids, and the number of amino-acids is limited. It is, therefore, inevitable that enzymes, whether extracellular or intracellular, will loosen and detach certain of the radicles, thus dissociating the protein and affording foodstuffs capable of being utilised by the cell. But doing this, to take the simplest case, the relative numbers of molecules of the different amino-acids presented to the cell and to its nuclear biophores will differ from the normal, and, if the exhibition of the foreign protein continues, so gradually will there be developed a tendency for the proportion of the radicles constituting the biophoric molecules to vary, those deficient in number being replaced by those that are abundant.

FIG. 10.



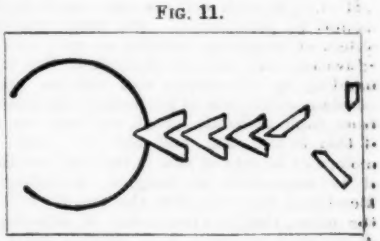
The pyrimidine ring.

Or, again, the simpler complexes due to the breaking down of the foreign protein may not be identical in constitution with those which prior to the exhibition of the foreign protein had been attracted to, and had constituted certain particular side-chains of, the biophoric molecules. In this way, again, the constitution of the biophores may become altered. This we may visualise as shown in Fig. 9.

I would recall how a slight difference in the relative attachments of the side-chains, say of the pyrimidine ring (Fig. 10), alters the chemical properties of the compound; in like manner what may appear to be but a slight modification in the constitution of a biophoric side-chain may be expected to lead to material differences in the reactions of the whole molecules—that is, in the case of germinal biophores—of the individual.

(3) One more postulate needs to be laid down. You will remember how I pointed out in my second lecture that the introduction of toxins, whether phytotoxins like abrin or bacterial toxins like those of diphtheria and tetanus, lead to the abundant if not over-production of antitoxins on the part of the cells.

FIG. 11.



The simplest explanation of this continued production is that when the toxin (which has all the properties of an enzyme) enters the cell it combines with and detaches certain side-chains. Whether the cell in consequence becomes destroyed or, on the other hand, succeeds in neutralising the toxin depends upon two factors—the number of toxin molecules that gain entrance and the rate at which the cell can reproduce the lost side-chains. Just as a damaged crystal, if placed in a saturated solution of the particular salt, repairs itself so we have to assume the capacity on the part of the living molecules to build up lost parts. So long, that is, as the toxin in the cytoplasm acts as a catalyst detaching the particular side-chains for so long will the molecular complexes build up side-chains until from the law of habit the function of formation of this particular order of side-chain in excess of the previous needs of the cell becomes established (Fig. 11), continuing even after the toxin has become either used up or discharged from the cell.

6. *Cell and Tissue Differentiation: Ontogeny.*

With this clear indication, therefore, before us of the way in which the cell substance can become modified and adapt itself according to need, it is not necessary, with Weismann, to postulate the existence of two orders of living matter, *germ plasm* and *somato-plasm*. It suffices to hold that there is one common biophoric material—or, at most, biophoric material in part derived from one, in part from the other parent—and to recognise that as the fertilised cell divides and re-divides and the resultant cells find themselves in different relationships so do they become modified and differentiated, giving origin to the various tissues, the eventual germ cells being so developed and so placed that they are exposed to the minimal amount of differentiation.

If embryogeny, or more exactly ontogeny—the development of the individual—is a recapitulation of the phylogeny—of the evolution of the race—it is this not as an historical reminiscence. It is this only so far as it is a necessity, only so far as, for the unfolding and elaboration of the cell structure of the various tissues up to the stage in which the adult of a particular species will find itself in equilibrium with its surroundings, the biophores distributed to those cells must of necessity in the course of their growth and multiplication pass through a particular succession of modifications, of accretions and losses, the one phase inevitably leading to the next. Where a given modification can be attained by a short cut there certain phases of the phylogeny fail to be recapitulated. In short, the development of any particular tissue may aptly be compared with the synthesis of one of the higher organic compounds. That cannot be accomplished by taking so much carbon, hydrogen, nitrogen, &c., mixing and heating them together, but demands a long process of building up—it may be a score or more successive processes of combinations, associations and dissociations—before the final product is attained; the constant endeavour of the chemist being to simplify the process, to arrive at the same results by finding some reaction which will cut out half a dozen or more of the steps and lead more rapidly and more economically to the same result.

7. *Amphimixis.*

This mention of the contribution of the two parental germ plasms to the fertilised germ cell, or zygote, leads to certain important considerations. If the metabolic activities of the cell are of the order here stated, and if, as is evident from the studies of cytologists and embryologists, equivalent amounts of heritable material—or biophores—from the two parents reach the zygote and, in the subsequent process of active cell division of the embryo, are contributed to each cell—i.e., to each cell nucleus—again the static conception cannot be permissible. We must realise that these two orders of biophores, existing in each cell of the body and activating each cell, are throughout life undergoing growth, building up side-chains and radicles, and that there is a constant recurrence of processes of association and discharge from each molecule out of, and into, the nuclear sap. But if this is the case, and the two orders of active living molecules lie side by side in the fluid medium of the nucleus, it is impossible to imagine, according to the current Mendelian doctrine, that the two do not interact one upon the other, that the two orders of side-chain substances and dissociation products keep severely apart. We may safely say that there must be interaction: that where radicles and groups of radicles built up by biophores of the one order become dissociated from those biophores, if of an order common to both paternal and maternal biophores, they may be employed indifferently in the building up and growth of biophores of both orders; if of an order peculiar to, say, the paternal biophores, they may under certain conditions be attracted to and built into the growing maternal biophores. We can imagine environmental conditions favouring the predominant growth of just the one group of biophores so that the cells of some one tissue take on the characters of the cells in the one parent, or, more easily, in actively working tissue cells, such an interchange and selection of allelomorphic radicles that eventually one common type of modified biophoric molecule may govern the cell.

And at a slower rate due to their more latent state, this same interchange, we must predicate, is capable of occurring in the biophores of the germ cells, so that eventually a succession of heterozygous generations will give rise to forms without the pure dominant gross characteristics, but showing an approximation to intermediate properties[11]; or, again, eventually, the interchange of radicles may be such that the various dominant radicles belonging to both orders of biophores be attracted to, built into the growing molecules and reproduced by the biophores of one parental origin—whereas the biophores of the other origin in their growth may show a greater affinity for the radicles whose constitution leads to the appearance of recessive qualities.

The existence of determinants as entities, as I have demonstrated, cannot on physical grounds be accepted, and if in their place we accept differences in the constitution or arrangement of individual radicles composing essential portions of the combined and complex molecules of living matter, it is still possible to interpret the facts of Mendelism, and, indeed, interpret not a few phenomena which by the hypothesis of determinants cannot be explained.

SUMMARY OF HYPOTHESIS.

However, I realise that, addressing medical men, here I advance into regions outside the boundaries of current medical thought. To sum up, it may be said that, according to this hypothesis, each species must be regarded as having for its essential living matter a distinct organic compound, a compound as distinct as any inorganic salt, but differing from that simpler inorganic salt in that, whereas the central ring or chain is of fixed constitution, the radicles composing that ring or chain are capable of attracting, and then of reproducing a series of side-chains which may vary, so that within the species there may be various strains, just as we may speak of various strains of crystalline hæmoglobin being obtained from different samples of human blood.

Let me freely admit that the diagrams here afforded have been very crude. With the necessarily condensed presentation of my subject they have seemed to me essential. To those unfamiliar with the advanced organic chemistry of to-day, to have attempted illustrations of the successive stages of my argument by elaborate graphic chemical formulæ would have been worse than useless. I shall be satisfied if I have rendered it clear that it is possible to replace an impossible hypothesis based upon supposititious, independent, and transposable determinants by one based upon what we know of the composition and physical structure of the main and outstanding constituent of living matter—the proteins—a hypothesis that renders it possible for us to understand how digestion or, more broadly, metabolism, is the keynote of the whole matter; how through this universal system of dissociation of foodstuffs into their elemental radicles it is possible for the cell to utilise and accustom itself to new and foreign foodstuffs; how doing this, the constitution of the living molecules may become altered; and how Professor Bateson's incapacity to comprehend the possibility of progressive acquirements by the individual and his germ cells is due to his static method of approach to the subject. To one who regards life, not from the morphological point of view, in terms of form, but from the physiological, in terms of function—who regards life as a moving equilibrium, who regards it as in essence "a state of persistent and incomplete recurrent satisfaction and dissatisfaction of ..... certain proteidogenous molecules," and metabolism as the primary and basal characteristic of living matter—for such an one there exists no such stumbling block.

Progressive Accretion of Properties.

Just as Weismann's hypothesis of heredity breaks down owing to the sheer physical impossibility of all the determinants it demands being packed into the microscopic nuclear chromosome, so the Batesonian hypothesis of a backward evolution by the progressive removal of inhibitory factors, like the baseless fabric of a vision, fades into nothingness once it is confronted with the demonstration that positive, direct acquirements can surely be brought about. Both hypotheses, indeed, enter into the limbo of the past, as examples of the Spencerian tragedy—that of a deduction destroyed by a fact.

I imagine that it will be your experience—it certainly has been mine—that it is those whose gentle birth is least obvious, and genealogy most dubious, those who hang on to the

[11] As in Correus's observations upon the hybridisation of the two strains of *Mirabilis jalapa*, *alba* and *rosea*, in which the heterozygotes of the F. generation are not of strong dominant rose colour, but of a paler dilute pink.

border-line of good family, who most vaunt themselves regarding their descent. They do not realise that in these days it is a man's ascent that ennobles him, not his descent, even if, paradoxically, ascent is not possible without good rich blood: it is the progressive accretion of properties, not the progressive loss. But, suggests Professor Bateson, in nature it is the opposite: it is by the progressive loss of properties that from being an amorphous mass of protoplasm man has become man. Life, according to him, first appeared upon earth enshrined in matter of maximum complexity, so complex that it was without form and void, and only as through the vast æons of geological time, this matter fell into order and simplified itself, and successive species developed, did we eventually in these latter days arrive at that simplest and least complex of all creatures, man—simple man.

Does it not appear to you that this is topsy-turvydom? Is it not, on the face of it, more probable that the reverse has been the case—that the earliest matter that could be recognised as living was the simplest. It is not that the earliest living matter possessed all the determinants of all the organised parts of all future forms of life, but that its constitution was such that it possessed, in consequence of its metabolic activities, the potentiality to undergo progressive modifications of that constitution, which modifications manifested themselves, as an outcome, in progressive changes of structure. *The potentiality was there, not the determinants.*

CONCLUSION.

One last word. I feel that, as one on active service, some apology may be required from me for having taken your time and, it may be said, my country's time, in dealing in the course of these four lectures with a matter so wholly foreign to the war, to military medicine, and military duties. Were what I have placed before you wholly new, had I collected, thought out, and elaborated the material of these lectures during the two years since I received the invitation to deliver the course, an apology would, I think, rightly be in place. As a matter of fact, these lectures are little beyond what I have taught and written in the 15 years and more preceding the war; they are a digest and compend of those earlier writings and conclusions, brought up to date by means of an occasional modern instance confirmatory of that earlier work. Fours hours ago, at lunch time, in order to complete my bibliography, I went to the library in Wimpole-street and took out the volume of the *British Medical Journal* for 1901, containing an address delivered by me at Brooklyn, New York, in May of that year.[12] That address I had not looked up for a decade or so, and it was not with a little surprise that I found laid down there the physico-chemical conception of inheritance here given, and the doctrine of direct inheritance of metabolic conditions, such as gout and of disturbances of the internal secretions. Rather, therefore, the apology should be that I have plagiarised myself in so wholesale a manner. I shall, however, be satisfied if in these Croonian lectures it is demonstrated that the work of medical men of this generation, of pathologists and bacteriologists, work founded upon the observations and methods of the great biologists of the past, is repaying the debt to biology by establishing principles which are basal for general biological advance.

[12] Brit. Med. Jour., 1901, i., 1317.

AN INDIAN CIVIL MEDICAL SERVICE.—The desirability of a separately recruited Indian Civil Medical Service, lately considered by the Royal Commission on the Public Services in India, has been decided in the negative, at all events, for the present. The general feeling in India appears to be that the question will arise in an acute form after the war. Numbers of civilian medical officers are now employed in important if not very lucrative civil surgeoncies.

A SCHOOL OF MASSAGE.—University College Hospital, Gower-street, W.C., and the National Hospital for the Paralysed and Epileptic, Queen-square, W.C., have appointed a joint committee to manage a school of massage and allied treatment on behalf of the two hospitals. The school is situated in Queen-square, Bloomsbury, and has been named the National Hospital and University College Hospital School of Massage and Electrical Treatment. The curriculum will include the teaching of massage, remedial exercises, and medical electricity, and it is expected that the first term will commence early in October. There is a comfortable hostel in connexion with the school for the use of students who desire to be resident.

PURULENT BRONCHITIS.

A STUDY OF CASES OCCURRING AMONGST THE BRITISH TROOPS AT A BASE IN FRANCE.

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THE numerous cases of purulent bronchitis which have arisen at one of the bases in Northern France during the winter of 1916–17 have presented features of marked clinical and pathological interest. Patients suffering from this unusually fatal disease present a symptom complex so distinctive as to constitute a definite clinical entity. The results of bacteriological and post-mortem examinations tend also to support this belief. The earlier cases were admitted during December, 1916, but it was not until the end of the following January, when exceptional cold prevailed, that the disease assumed such proportions as to constitute almost a small epidemic. Later, when the frost abated, there was a very striking diminution in the number of cases.

The disease has been very fatal. This is shown most readily by post-mortem records referring to this period. During February and early March, while the outbreak was at its height 45 per cent. of the necropsies in this area showed the presence of purulent bronchitis.

It is proposed to discuss this condition from three standpoints: (1) that of the clinician; (2) that of the bacteriologist; and (3) that of the morbid anatomist.

1. THE CLINICAL ASPECT.

Clinical types.—The cases which came under our notice can be divided broadly into two types.

The first and more acute presents a clinical picture which closely simulates ordinary lobar pneumonia with a sustained temperature of about 103°, and expectoration at first blood-streaked—rather than rusty—which, however, rapidly becomes quite purulent. The pulse-rate in these cases is out of all proportion to the temperature in its rapidity. Dyspnœa and cyanosis are prominent features. The patient usually dies from "lung block," resulting in embarrassment of the right side of the heart on the fifth or sixth day. For the last day or two there is often incontinence of the fæces, due, no doubt, to the condition of partial asphyxia. The mental state is one of torpor; delirium is the exception.

The second and less acute type is marked by a more swinging temperature with a range of 2° or 3°. The expectoration at first may be frothy and muco-purulent, but it very soon assumes the typically purulent character. This form may run a long course of from three to six weeks, during which time the patient wastes a great deal and has frequent and profuse sweats; indeed, at a certain stage the illness is most suggestive of acute tubercular infection, and it is only by repeated examination of the expectoration that the clinician can satisfy himself he is not really overlooking a case of acute pulmonary tuberculosis. The majority of our cases conforming to this type have ultimately recovered, but the convalescence is slow and tedious.

Detailed Symptomatology.

Onset.—Whilst a history of a previous catarrhal condition lasting for a few days is often obtained, the disease quickly assumes an acute character; we have been able to observe this in patients admitted in the first instance for a surgical condition. Taking the average readings from the charts of patients admitted into this hospital with purulent bronchitis, we find the temperature is between 102° and 103°, the pulse 120 or over, and the respiration about 35. The patient frequently complains of shivering and looks pathetically miserable, but we have not seen an actual rigor. Despite his obvious shortness of breath, the sisters have noticed that, at any rate at first, he prefers a lateral position low down in the bed, and resents any attempt to prop him up.

Cough.—This for the first day or two may be irritable and distressing with a little frothy expectoration, but as the latter becomes more purulent the cough is less troublesome,

and soon the patient is expectorating easily and frequently until the latter stages are reached; when owing to increasing asphyxia the patient becomes more and more torpid, the cough subsides, and hardly any secretion is brought up. This failure becomes an added factor in bringing about a rapidly fatal termination.

Expectoration.—The sputum, with its yellowish-green purulent masses, is very characteristic, and may be one of the first indications of the serious nature of the illness the patient is suffering from. A fuller description follows in the bacteriological section.

Temperature.—The fever of this complaint does not follow any very constant type. In nearly all our cases the pyrexia was of sudden onset, and for the first few days was more or less sustained at about 103°. Later it conformed more to the swinging type with a range of several degrees. In a few cases a curious gradual ante-mortem drop has been observed. The accompanying charts demonstrate this point. (See Charts 1, 2, and 3.)

Pulse.—Tachycardia is a very constant feature throughout the illness. The rate is frequently well over 120, though the volume may remain surprisingly good until immediately before death.

Some degree of dyspnœa is always present, and is usually progressive, though towards the end in the fatal cases when the mental acuteness is dulled by the increasing asphyxia the patient is not distressed by its presence. In some cases there have been paroxysmal exacerbations of the breathlessness, accompanied by a state of panic, in which the patient struggles wildly and tries to get out of bed in order to obtain relief. Cyanosis is another prominent feature throughout the illness. At first it may not be more than duskiness, but in the later stages it becomes very evident. It is only slightly relieved by oxygen; this, no doubt, is partly explained by the difficulty in giving the oxygen efficiently owing to the patient's objection to any mouth-piece that fits at all tightly and partly by the blocked condition of the bronchioles interfering with the absorption of the oxygen.

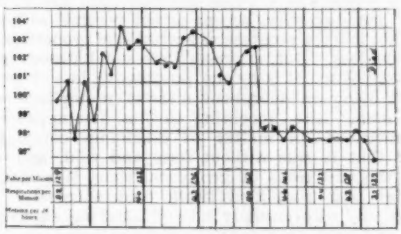
Physical Signs.

The condition usually begins with the presence of a moderate number of sharp crepitant râles, often first heard in the region of the root of the lung; these quickly become generalised. In the majority of the cases signs of broncho-pneumonic patches can be made out; these are generally situated near the root of the lungs. In a certain number of cases these patches spread and become confluent, giving practically all the physical signs of a lobar pneumonia. As the disease progresses the air entry is diminished; on listening one is often struck by the small volume of sound heard. The resonance of the lungs may also be lessened. A slight pleuritic rub was heard in a few of our cases, but this was soon masked by the bronchitic signs.

Treatment.

The treatment of this condition is not satisfactory. So far, in the worst cases, we have been unable to find anything that has any real influence on the course of the disease.

CHART 1 (Private M.).



Shows the temperature course in the more acute type of case. The temperature ends by crisis, but the pulse-rate remains high and the symptoms (cough, dyspnœa, &c.) persist. Death occurred in this case two days after the crisis. *Bacillus influenzæ* isolated in this case.

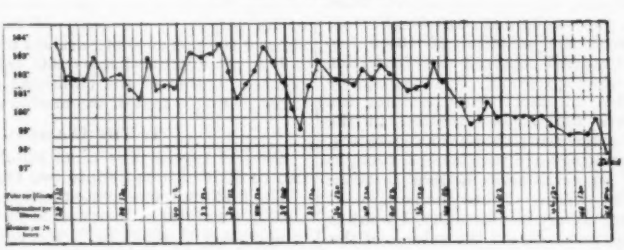
Inhalations of steam with eucalyptus, tinct. benzoin. co., &c., seemed to give considerable relief, and in order to make this as continuous as possible we have recently treated our more urgent cases in a steam tent with encouraging results. The cough is rendered less troublesome, and the expectoration being kept less tenacious is more easily expelled, a most important point, for once the patient ceases to bring up the purulent secretion he quickly goes downhill, becoming more and more cyanosed with right-sided failure of the heart.

The results obtained from oxygen are disappointing, the relief being slight and very transitory. We have already mentioned our explanation of this observation.

Venesection has likewise failed to benefit the patient for more than a very short time, though possibly we have not resorted to this treatment sufficiently early.

For drugs we have chiefly relied on digitalis and iodides with other expectorants. In the last stages, when the patient has ceased to expectorate, atropine given hypodermically has given temporary relief. Adrenalin has also assisted to prolong life. Pituitary extract increased the incontinence so many of our patients suffered from towards the end, and for this reason probably did more harm than good. Strychnine and camphor in oil were also tried, but without any marked benefit. A suitable vaccine may be shortly forthcoming, but up to the present we have not been able to give this line of treatment a fair trial.

CHART 2 (Private C.).

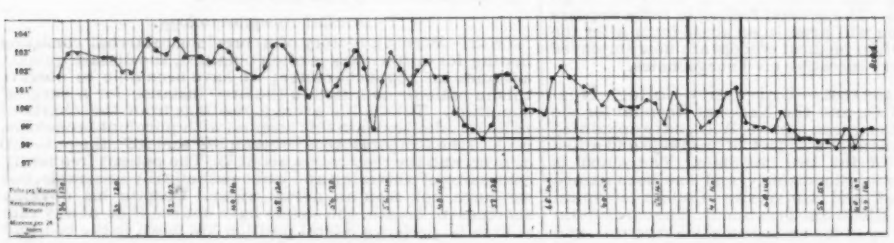


A less acute case than the preceding. Note the prolonged, rather swinging temperature and the fall by lysis without diminution of pulse-rate just before death. *Bacillus influenzæ* isolated.

2. BACTERIOLOGY.

Since the outbreak of the epidemic of purulent bronchitis with which this investigation is concerned 20 specimens of sputum have been submitted to the laboratory for bacteriological examination. These have all been taken from cases which in their clinical aspect differed from cases of ordinary bronchitis, and most of which presented many of the signs and symptoms described in another part of this paper. In 4 of the cases the sputum examination was supplemented by an examination of pus taken post mortem from one of the

CHART 3 (Private B.).



his shows a course similar to that of the preceding case but of longer duration. The ante-mortem fall of temperature is again very marked. A Gram-negative bacillus resembling *Bacillus influenzæ* present in large numbers in films, but *B. influenzæ* was not isolated.

smaller bronchi. In most of the fatal cases a histological examination of the lungs and other organs was made, while in 3 of them an unsuccessful attempt was made to obtain a growth from the enlarged bronchial glands. Certain animal experiments were also made in 3 of the cases; these will be described later.

Sputum Examination.

In each case, after noting the naked-eye appearance of the sputum, films were made and stained by Gram's method and a portion was afterwards plated out on blood-agar or trypsin-broth-legumin-agar.

Character of sputum.—This is in nearly every case markedly purulent. Usually no mucus is present, but in some cases the sputum is muco-purulent. The colour is yellow or greenish-yellow and the consistence thick. Usually it has a nummular character. No blood has been observed in any of the specimens submitted. There has been no appreciable odour.

Examination of films.—In all but three of the cases direct examination of films of the sputum showed the presence of more than one organism. In 18 of the 20 cases there was present a small Gram-negative cocco-bacillus, which was afterwards identified as the *Bacillus influenzæ*. This occurred as a rule in typical clumps consisting of large numbers of bacilli. The individual organisms appeared sometimes as minute elongated cocci, often arranged in pairs, and in other cases were less coccoid and more definitely bacillary. In 10 of the cases in which it was found it was the predominating organism, being present in some in enormous numbers. In 3 of the cases no other organisms could be seen in the films, but *B. influenzæ* was abundant.

Cultural examination.—The method employed was to remove a small piece of sputum by means of sterilised forceps from the sterile bottle in which it had been collected. The sputum was then thoroughly washed by shaking in sterile saline, and a piece of the washed sputum was plated out on blood-agar or trypsin-broth-legumin-agar. The latter, on account of its transparency and the relative ease with which *B. influenzæ* grows on it, gave the better results. In this way the influenza bacillus was isolated in 10 of the 18 cases in which an organism resembling it was seen in direct films.

In the investigation of the other organisms present many were diagnosed both from their morphological and cultural characters. But in some of the cases, owing to lack of time, the appearance of the organism as seen in direct films was alone noted. With this proviso it may be stated that in the cases here shown the following organisms other than *B. influenzæ* were found:—

	Cases.		Cases.
Pneumococcus	13	*M. tetragenus*	2
Streptococcus	5	A Gram-positive diplococcus	1
A Gram-negative diplococcus resembling *D. catarrhalis*	5	A large Gram-negative bacillus	1
Staphylococcus	3	*B. tuberculosis*	1

From the following table it will be seen that in most of the cases in which *B. influenzæ* was present in large numbers the pneumococcus also occurred.

Characters of the Bacillus Influenzæ Isolated.

The microscopical appearances are usually those of a minute, slightly elongated coccus with a tendency to grow in pairs end to end. Some longer and more definitely bacillary forms are also, as a rule, present. The organism stains somewhat slowly with ordinary stains and is always definitely Gram-negative.

On "trypagar" growth does not usually appear until 36 hours at least have elapsed. Very small translucent colonies can then be seen which have a convex surface and regular rounded edges. In primary cultures from sputum the influenza bacillus appears to grow more luxuriantly in the vicinity of colonies of other organisms. The colonies are very easily emulsified in water. Attempts at subculture on legumin-agar nearly always failed. On blood-agar growth appears within 24 hours in the form of small transparent colonies. The organism can be repeatedly subcultured on this medium, and though it ultimately tends to die out one strain has at the time of writing been kept going on it for over a month, subcultures being made about once a week. With ordinary agar, glycerine-agar, solidified blood serum, broth and gelatin no growth is obtained. Nor could the organism be cultivated anaerobically on any of the media used.

Table Showing that in Most of the Cases in which B. Influenzæ *was Present in Large Numbers the Pneumococcus also Occurred.*

Serial No.	Name, &c.	Examination of films.	Result of culture.	Other organisms present.	Death or recovery.	Remarks.
1	Pte. C.	+++	+	...	D	Case of bacillary dysentery with septic bronchitis.
2	Pte. H.	+	—	*D. catarrhalis.*	D	Had broncho-pneumonia, right pleural effusion and toxic nephritis.
3	Pte. K.	++	+	None.	D	Had broncho-pneumonia
4	Pte. M.	++	+	*D. catarrhalis.*	D	No pneumonia.
5	Pte. G.	++	—	Streptococcus. Pneumococcus. *D. catarrhalis.*	D	Broncho-pneumonia and toxic nephritis also.
6	Pte. C.	+++	+	Streptococcus. Pneumococcus. *D. catarrhalis.*	D	...
7	Pte. A.	+++	+	Pneumococcus (scanty).	D	Marked emaciation.
8	Pte. U.	+	+	Pneumococcus. *D. catarrhalis.* A Gram-positive diplococcus.	D	Widespread broncho-pneumonia.
9	Pte. G.	++	—	Pneumococcus. Numerous others.	R	...
10	Pte. W.	++	—	Many others.	R	...
11	Pte. W.	++	—	Pneumococcus. Streptococcus.	D	Broncho-pneumonia.
12	L/C. S.	++	—	Pneumococcus.	R	...
13	Pte. D.	—	—	Pneumococcus.	R	...
14	Pte. V.	++	—	*B. tuberculosis.* Staphylococcus. Pneumococcus.	D	Acute tubercular broncho-pneumonia.
15	Pte. H.	+++	+	Staphylococcus. Streptococcus. *M. tetragenus.*	D	Broncho-pneumonia and emphysema.
16	Rev. G.	—	—	Pneumococcus. Streptococcus. *M. tetragenus.*	R	...
17	Pte. T.	—	+	Pneumococcus.	R	...
18	L/C. H.	++	—	Pneumococcus.	D	Double lobar pneumonia.
19	Pte. F.	++	+	Pneumococcus.	R	Lobar pneumonia.
20	Pte. C.	+++	+	Large Gram-negative bacillus. None.	D	No pneumonia. Ante-mortem fall in temp.

Col. 3: +, *B. influenzæ* present in small numbers; ++, in moderate numbers; +++, in large numbers; —, not found.
Col. 4: +, *B. influenzæ* isolated; —, not isolated.

Animal experiments.—Two strains of the organism isolated were injected into mice intraperitoneally and into rabbits intravenously. In another case in which the *B. influenzæ* was present in the sputum in large numbers and was practically the only organism found, a suspension of the sputum in saline was similarly injected into a rabbit and a mouse. In all cases the animals survived and showed no signs of illness.

Vaccine therapy.—A vaccine was prepared from the organism isolated from one of the later cases, but by the time this was ready the epidemic was almost over, and up to the time of writing there has not been a suitable opportunity of using it. It is not, however, likely, if one may judge from the blocked state of the bronchioles, that vaccine therapy will be of any value except in the early stages.

3. MORBID ANATOMY.

The prevalence of bronchitis of a purulent type is seen from a study of 156 consecutive necropsies made during February and early March, 1917, in which it occurs as a primary condition in 45 and as a secondary condition in 26 of the cases examined. Altogether purulent bronchitis was found in 45·5 per cent. of the total cases. In the cases examined bronchitis is more than five times as numerous as lobar pneumonia, which is the other prominent pulmonary disease. Tuberculosis in the form of obsolete foci in lungs or glands was present in 8 of the total 71 cases. In the whole 156 cases tuberculosis was noted in 14. In none of the cases of bronchitis did tuberculosis appear to be active. It occurred in 3 which are regarded as primary, and in 5 secondary cases. It would appear not to bear any definite relation to the incidence of the condition.

Appearances which might be regarded as typical are as follows.

The face is more often than not cyanosed, and often a considerable degree of wasting is present, though in the more rapidly fatal cases this is not so apparent.

The lungs show three prominent features. They are almost always bulky on account of a great amount of emphysema which affects chiefly their anterior margins. The heart is often greatly obscured by bulky lung when the chest is opened.

Some degree of pleurisy is generally present; more often this is plastic in type, though occasionally small collections of fluid are found in the pleural cavities; clear yellow fluid was found in 8 of the cases examined, 5 of these being primary. In only 2 cases did the effusion exceed a few ounces; both of these were cases of primary bronchitis. Empyemata are not often found.

The third feature is the constant appearance of a thick yellowish pus in the bronchi. In the larger bronchi it is mixed with air, and often is discoloured by altered blood; but in the small tubes cut in section the pus exudes spontaneously as a rule, with little or no admixture of air. A lung cut in the ordinary way may show large numbers of small yellow points from which pus is exuding.

Considerable œdema is commonly associated with the above appearances, and a greater or less degree of collapse, generally at the vertebral borders of the lower lobes, was found in 15 of the cases examined.

A certain number of cases pass on to a condition of broncho-pneumonia, and when this occurs it usually shows itself in the form of small solid nodules, in the centre of which are pus-containing bronchioles. Consolidation has been first observed near to the roots of the lungs, and in a few has been so extensive as to simulate lobar pneumonia at the necropsy. Broncho-pneumonia was recorded in 32 of the 71 cases examined, of which 22 occurred in cases primary from the start.

In 34 of the cases of primary bronchitis lymphatic glands in the root of the lung, the bronchial group, and the tracheal glands were noted as greatly enlarged, and on section they were grey or pinkish-grey in colour. Not uncommonly the mesenteric and retroperitoneal and even inguinal and axillary glands were found affected.

The spleen in many cases was found engorged and not soft. On cutting the organ the corpuscles were often found to stand out prominently as if sharing in the disorder of the lymphatic glands.

Some degree of derangement of the kidneys was noted in 25 out of the 45 primary cases, taking the form of some swelling and pallor of the cortex. Often the kidneys had lost their firm consistence and were flabby and in a few cases soft. Engorgement, on the other hand, was noted in a few, generally accompanied by engorgement of the spleen. The liver very often showed evidence of fatty change.

The right side of the heart was almost always dilated and the myocardium commonly pale and friable. No evidence of endocarditis was found in any case. A few ounces of pericardial fluid, always pale yellow and clear, were found in 10 cases, but this was not associated with any roughening of the pericardium or cohesion of its surfaces. Broadly speaking, these findings fall into two groups. In one the organs are congested, the heart dilated, though fairly healthy, and the patient cyanosed; in the other the organs are flabby or soft, the heart muscle pale and friable, and the patient pallid. The first group corresponds with a suffocative and the second with a toxic death.

Histology.

An examination of portions of lung, bronchial gland, and kidney taken from eight of the fatal cases was made. The following is a summary of the histology of these organs.

Lungs.—The most striking changes are in the smaller bronchi. Their walls are thickened and the vessels engorged; the lining epithelium, which is at first intact, is later detached in parts from its basement membrane, and the epithelial cells can be seen lying free in the lumen. In a still more advanced stage the bronchiole is entirely denuded of mucous membrane, and its wall consists of granulation tissue which greatly diminishes its calibre. The bronchi are in the less advanced stages almost completely filled with pus, in which, in some cases, the influenza bacillus was found in appropriately stained sections. Later on columnar epithelial cells in small masses are mixed with the polymorphonuclear pus cells, and by the time the epithelium is entirely shed the amount of pus in the bronchus is greatly diminished. Many of the specimens show marked broncho-pneumonia, but in some there is no great extension of the inflammatory process to the surrounding lung tissue. Indeed, the small extent to which catarrhal pneumonia is often present in the vicinity of markedly involved bronchi would suggest that the pneumonia is due to a local toxic effect rather than to an infection of the corresponding area of lung tissue.

Bronchial glands.—There is extreme congestion and enlargement of lymph nodes. In one specimen one of the larger arteries was thrombosed, but no suppurative change was present in any of the cases.

Kidneys.—In almost all there is degenerative change in the tubular epithelium due to toxic action. This varies in degree, and in the most marked cases there is desquamation of epithelium, round-cell infiltration, and congestion, the condition being indistinguishable from an acute tubular nephritis.

CONCLUSIONS.

1. We are here dealing with an epidemic of a variety of purulent bronchitis.

2. For the following reasons we consider the cause of the disease to be the influenza bacillus: (*a*) The almost constant occurrence of this organism in the sputum; (*b*) its presence in the pus of the affected bronchioles; (*c*) in some typical cases it occurs apart from the presence of any other organism; (*d*) the outbreak of the disease in epidemic form at the time of year when influenza epidemics are most common and whilst one was actually in progress; (*e*) the marked signs of toxic poisoning which are found during life and post mortem.

3. There are well-marked clinical features which distinguish these cases from ordinary cases of bronchitis. The most prominent are the characteristic sputum, the extreme tachycardia, the cyanosis, the course of the temperature (notably the ante-mortem fall), and the extremely high mortality.

4. Treatment has so far been unsatisfactory. The most encouraging results have been obtained by use of a steam tent. Vaccines have not yet had a trial, but it is unlikely, in view of the blocked condition of the bronchioles, that they would be of great benefit.

5. The morbid anatomy consists of three groups of changes. (*a*) The lung condition: Marked purulent bronchitis, the smaller bronchi being filled with thick pus, from which air is notably absent. In some cases secondary broncho-pneumonia and œdema, pleurisy, and emphysema are common. (*b*) Evidence of toxæmia: Especially seen in kidneys, spleen, liver, lymphatic glands, and heart muscle. (*c*) Signs of right side heart failure and passive congestion. Some cases die of the toxæmia and others of the cardiac failure.

6. The histological changes are those of an acute purulent bronchitis affecting the smaller bronchi with or without some surrounding catarrhal pneumonia. Degenerative changes are seen in other organs, notably in the kidneys, where the appearances of a toxic nephritis may be found.

We are indebted to Colonel Sir John Rose Bradford, K.C.M.G., who originally pointed out to us the distinctive nature of these cases and who has given us much kind assistance throughout the investigation. Our thanks are also due to Professor J. H. Teacher, of Glasgow, for his kindness in preparing the photo-micrographs.

DESCRIPTIONS OF FIGS. 1 TO 6.

FIG. 1 (Case 7).—Marked congestion of bronchial wall with polymorph infiltration. Mucous membrane well preserved except at one part. Lumen almost completely filled with pus. No peri-bronchial pneumonia. (Same size as original.)

FIG. 2 (Case 7).—Part of the wall of a large bronchus showing congestion of submucosa, emigration of leucocytes through the swollen mucous membrane, and the purulent collection in the bronchial lumen. (× 120.

FIG. 3 (Case 4).—A moderately large bronchus with muscular and cartilaginous wall. There is free desquamation of epithelium which is seen lying among the pus in the lumen. The adjacent lung tissue (of which very little is here shown) is markedly congested, but not consolidated. (× 60.)

FIG. 4 (Case 6).—A bronchiole almost full of pus. Only here and there can the remains of mucous membrane be detected. There is a pneumonic condition in the surrounding air vesicles, large pigmented catarrhal cells being present. (× 60.)

FIG. 5 (Case 6).—A high-power view of part of the preceding specimen. It shows the purulent bronchial contents, the remains of mucous membrane, and the surrounding catarrhal pneumonia. (× 120.)

FIG. 6 (Case 3).—A small bronchus showing a later stage than the other photographs. Epithelium completely shed and the much-thickened mass consisting entirely of young granulation tissue. Surrounding lung tissue congested, but no pneumonia present. (× 60.)

FIG. 1.

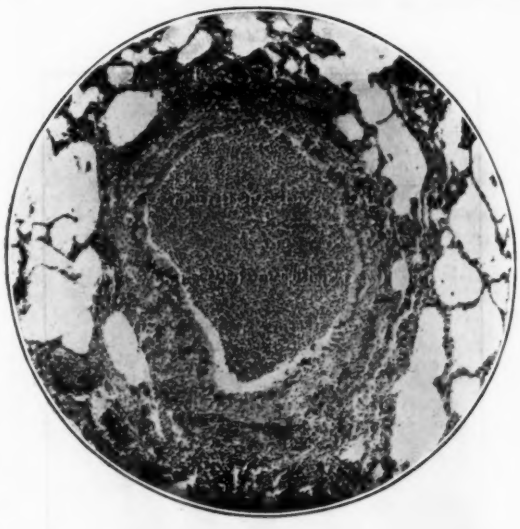


FIG. 2.

FIG. 3.

FIG. 4.

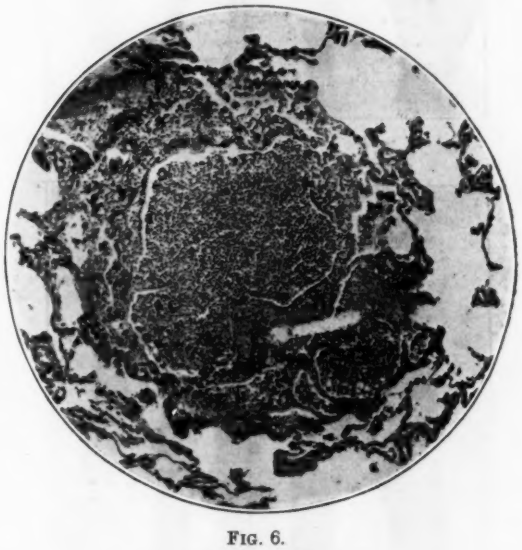


FIG. 5.

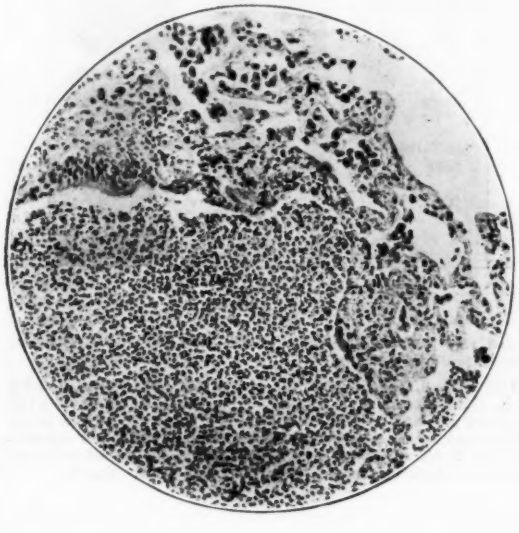
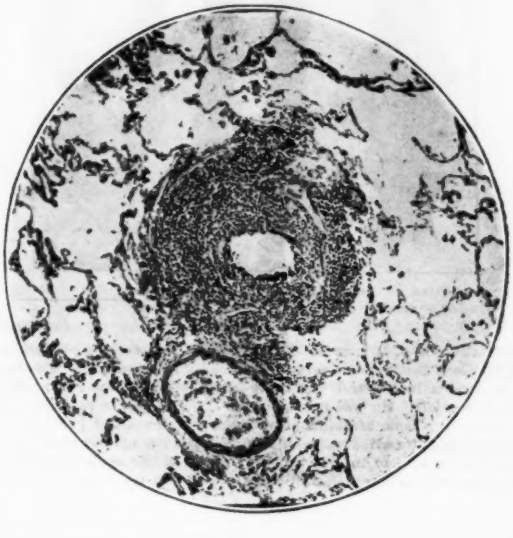


FIG. 6.



Skiagrams Illustrating Captain Pirie's Cases of Marching Fractures.

FIG. 1 (Case 1).

FIG. 2 (Case 2).

FIG. 3 (Case 3).

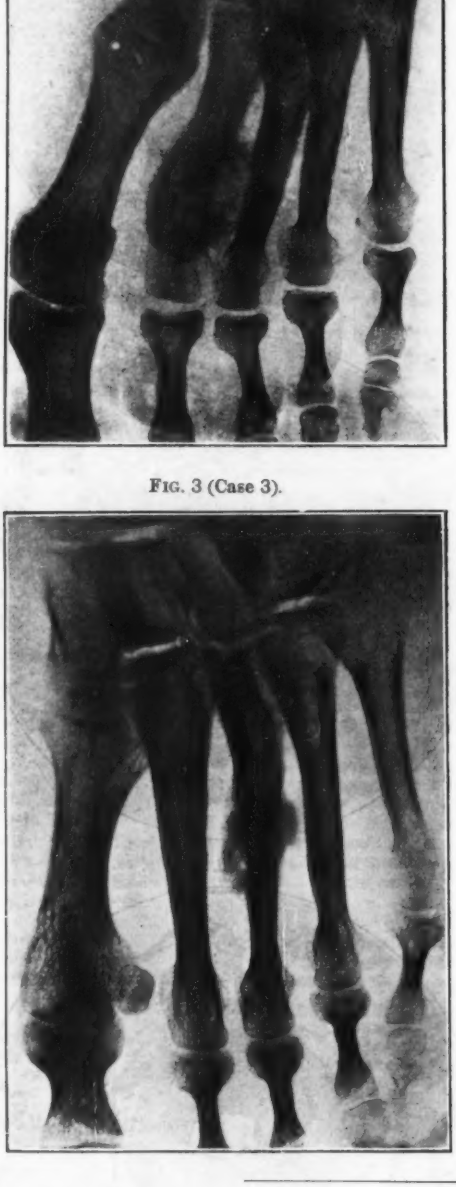
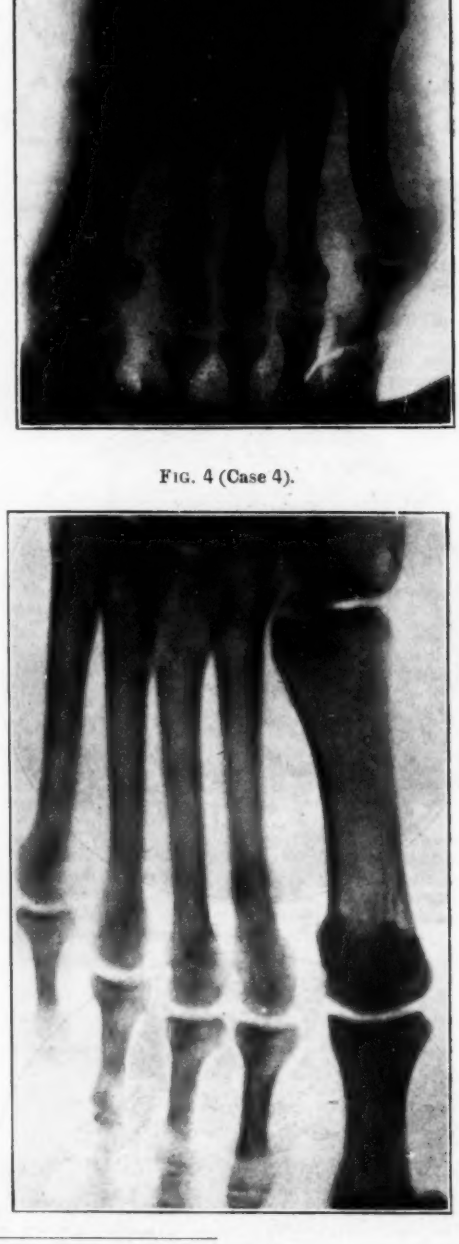


FIG. 4 (Case 4).



Descriptions of Cases.

CASE 1.—A. J. M., age 39. Unaccustomed to marching; began hard marches. Feet became very sore, specially after resting. Six weeks ago after a hard march the right foot swelled and was more painful than the left. He was not aware of a sudden acute pain like that caused by a bone breaking. The right foot continued painful for a month, but he carried on, going into the trenches and out again. After four weeks he had to give up. At the end of the sixth week he was X-rayed in our hospital, and there was shown to be fracture of the second right metatarsal bone near the head, surrounded by very abundant callus. (Fig. 1.)

CASE 2.—A. S., age 19. Marched for ten days with full pack, doing about 10 kilometres a day. While marching on the tenth day his feet were very sore and he felt a sudden acute pain. He carried on for nearly three weeks, at the end of which he was sent to our hospital, where an X ray was made, showing fracture of the second and third right metatarsals near the head, with abundant callus. (Fig. 2.)

MARCHING FRACTURES.

BY A. HOWARD PIRIE, B.SC., M.D. EDIN.,
CAPTAIN, C.A.M.C.

BY a "marching fracture" is meant fracture of a second third, or fourth metatarsal bone, or combination of these, in the right or left foot, caused by marching, and with no history of an accident.

This fracture comes under the class of fracture caused by muscular action combined with indirect violence, and is caused by severe prolonged marching.

My attention was called to it by two men coming the same day with the same kind of fracture of a metatarsal bone, and neither of them would admit an accident. The typical history is that after a long march, such as 29 kilometres in one day in full marching order or after 10 kilometres a day for ten days, the patient's feet become very sore, especially when standing up after resting. This indicates that the arch of the foot is giving way. The breaking of a metatarsal bone then takes place while marching. This seems to be Nature's method of making the man lie up, so that the arch of the foot may recover itself. The patient does not know when the fracture takes place, as his feet are already so sore from the acute flat-foot. After the fracture takes place he struggles on for a time, but has finally to fall out. He remains with his unit because most of the other men have sore feet too, and there is a stigma attached to a man who falls out because his feet are sore. A time comes—it has been usually about three weeks in our experience—when he has to give up and is sent to hospital.

The X ray photograph made three weeks after the fracture takes place shows a fractured metatarsal bone with abundant callus. One seldom sees so much callus formed in three weeks as occurs in these fractures. No doubt this is due to movement during walking with the fracture.

The exact cause of a marching fracture seems to be the following. In the normal foot the arch of the foot is so constructed that the bulk of the weight of the body is transmitted through the stout first metatarsal. The next strongest bone is the fifth metatarsal, which takes the next largest share in bearing the weight of the body. By referring to the skeleton one sees that the second metatarsal is the weakest bone, the third and fourth following it in order of strength.

When the arch falls down the weight of the body is distributed more equally to all the metatarsals, but the central ones being in more direct line with the astragalus get more than their share of the weight, and the second metatarsal being in direct line with the head of the astralagus gets the greatest proportion of the weight of the body. It receives more weight than it is constructed for, and under prolonged strain of long marching, when the soldier is carrying his full equipment, it gives way.

When a person stands on his toes on one foot, the greatest breaking strain is near the head of the metatarsal bones, and this is the position in which the fracture occurs most frequently. It probably occurs when the man rises on to the toes of one foot to make a forward step with the other foot.

In four of our cases the fracture occurred near the head and in two near the middle of the shaft.

This fracture must be fairly common during the long marches made by our men, as these six cases have come to my notice in a series of 13,000 X ray negatives.

FIG. 5 (Case 5).

FIG. 6 (Case 6).

Descriptions of Cases (continued).

CASE 3.—E. T., age 29. After a march of 29 kilometres in one day his feet were very sore. Next morning his feet felt "as if they were going to burst." That day he marched 9 kilometres, and had to fall out from the pain in his feet. No history obtainable of any sudden breaking pain. He was flat-footed before joining the Army. About three weeks after the day he had to give up after marching 9 kilometres he came to our X ray department, and the X rays showed fracture of the third right metatarsal about its middle, with abundant callus formation. (Fig. 3.)

CASE 4.—C. O., age 30. While on a long march pain of acute kind came on in his left foot, and he had to fall out. He had no accident to cause the pain. He carried on for about three weeks, and the X ray photograph made five weeks after the time when the acute pain came on shows fracture of the second left metatarsal near its head. (Fig. 4.)

CASE 5.—T. N., age 34. During a long march, with full equipment, he felt severe pain in his left foot. No history of accident to it. He carried on with his unit for two weeks, and then had to give up. Three weeks after the severe pain the X ray photograph showed fracture of the third left metatarsal about its middle. (Fig. 5.)

CASE 6.—Pte. B., age 19½. Felt severe pain in foot during a long march. Came for X-rays three weeks later. X rays showed fracture of fourth right metatarsal near the head, with abundant callus. (Fig. 6.)

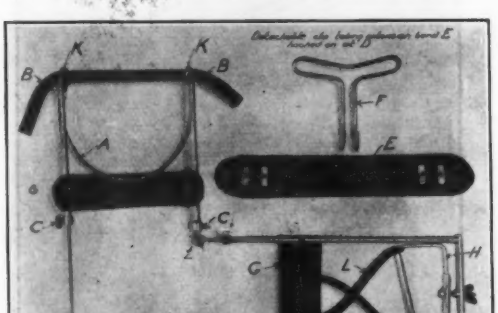
A UNIVERSAL EXTENSION-SPLINT FOR GUNSHOT FRACTURES OF THE UPPER LIMB.

BY REGINALD WILLIAMS, L.R.C.P. & S. EDIN.,
LATE CAPTAIN, R.A.M.C.; SURGICAL SPECIALIST, BARNET WAR HOSPITAL.

So many are the methods for dealing with fractures of the bones of the arm that it might seem superfluous to suggest another were it not that in that very multiplicity of method a difficulty lies. For though the specialist, particularly if appointed to a hospital in England, may be able to make suitable selection for an individual case from a varied assortment of apparatus, this is impracticable in field-service work, where simplicity and unification are of paramount importance. The question therefore arises, is it possible from a study of the cardinal principles of the already existing types to evolve a simple apparatus for each limb, affording not only adequate treatment for all typical fractures, but easily applied, adjusted, and packed.

In the present article the problem of the upper limb alone is dealt with, consideration of the lower limb being deferred till later. And, first, as to the essential attributes of such a splint. A splint for gunshot fractures should provide: 1. Efficient immobilisation of the whole limb. 2. Ready access to wounds without disturbance of immobilisation. 3. Adequate extension of the broken segments. 4. Maintenance of joints in a position of physiological rest or of maximum functional utility in view of possible subsequent stiffness and adhesions. 5. Distribution of pressure over as wide an area as possible to prevent pressure sores. 6. Lightness and adaptability for application to limb and also for transport. 7. A composition, such as rubber and galvanised metal, which can be easily cleaned and sterilised.

FIG. 1.



Description of Splint.

It is probably generally acknowledged that the only system which adequately combines immobilisation with access for dressings is some form of metal frame following the outline of the limb and affording support to the latter by means of slings.

Fig. 1 shows a splint of galvanised wire after the pattern of the cradle splint of Major E. Hey Groves, but differing essentially therefrom in that the wire framework does not pass under the axilla. The shoulder-piece (A) is hinged to the tubular framework in such a manner as to allow of its being swung into any position. It can thus be used for either arm and packed flat for transport. Through the hinges connecting the shoulder-piece to the frame a rubber tubular band passes under the axilla, firmly gripped by the said loops, but not too firmly to prevent adjustment. To the forward end of the splint is affixed an angled loop of wire (H) secured by a bolt which passes through the frame and forms a pivot about which the loop can turn, the bolt being provided with a winged nut by which it can be tightened at will and set at any desired angle of supination. In whatever way the wrist is fixed, as the hand-piece swivels on a transverse bar movements of flexion of the wrist are not prevented, nor are movements of the fingers interfered with. A flat elastic band (L) is passed under the wrist and crossed over the back of the hand, the hooked end being attached to the angled loop of wire (H). Accessory rubber slings (G G) are hooked on to the frame when necessary. The detachable T shaped metal loop (F) is hooked on to the winged nut (D) at the lower angle, and the broad elastic band (E) is affixed below the elbow for fracture of the humerus (see Fig. 2) and behind the elbow for fractures of the lower arm, as shown in Fig. 4.

FIG. 2.

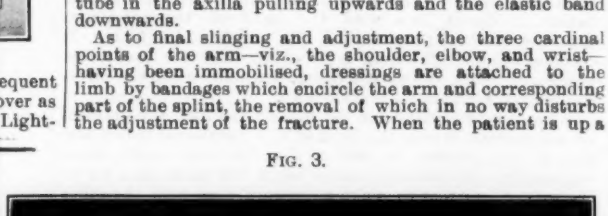
Universal splint applied to a case of fractured humerus.

Method of Application.

Fracture of humerus (Fig. 2).—One end of the axillary tube (B) having been withdrawn, the angled splint is laid over the fractured limb. Accessory rubber slings (G G) are placed in position; the tubular axillary band is replaced in the head-piece and drawn taut, thus fixing the splint at the shoulder. The wrist is next fixed to the hand-piece (H). The broad elastic band (E) is then passed over the forearm and fastened with the necessary degree of tension to the T-shaped metal loop (F). (See Fig. 3.) By this arrangement constriction of the soft parts and interference with the venous return are avoided. Traction being now applied, the fractured segments of bone are drawn asunder, the rubber tube in the axilla pulling upwards and the elastic band downwards.

As to final slinging and adjustment, the three cardinal points of the arm—viz., the shoulder, elbow, and wrist—having been immobilised, dressings are attached to the limb by bandages which encircle the arm and corresponding part of the splint, the removal of which in no way disturbs the adjustment of the fracture. When the patient is up a narrow sling passes round the wrist portion of the splint and supports it to the neck. The limb can be lifted into any position desirable for dressing and irrigation purposes, as also for the prevention of fixation at the shoulder-joint. (See Figs. 2 and 3.)

FIG. 3.

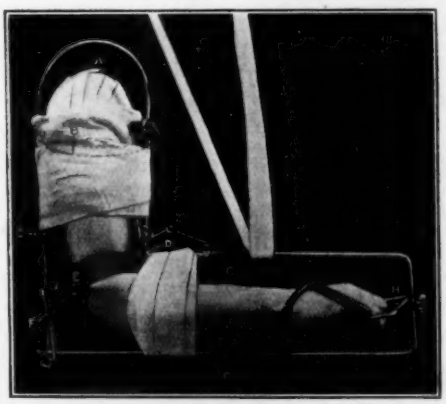


Fractured humerus put up as in Fig. 1, the limb being raised and abducted for dressing purposes.

Fracture of forearm.—The shoulder having been fixed, the rubber band (L) is attached to the hand-piece (H), which is

fixed in any position desired by means of the T nut controlling the hand-piece. The rubber band (E) is passed above the elbow and attached to the T-shaped metal loop (F), now fixed in position behind the elbow. The T screws (C C) are loosened and the forward end of the splint is drawn out till sufficient tension on the broken segments is obtained. The screws are then fixed in this position. Fig. 4.)

FIG. 4.



Universal splint applied to a case of fractured forearm. The forearm is completely pronated.

Fracture in elbow region.—In Fig. 5 the T screws (C C C C) and the winged nuts (D D) (Fig. 1) have been loosened and the forearm portion of the splint has been straightened and fixed in position. The T-shaped attachable loop (F) has been removed and the rubber band (E) has been used as an accessory sling.

FIG. 5.

Universal splint applied to a case of fracture of the neighbourhood in the elbow-joint.

Advantages of the Splint.

The advantages of this splint are the following:—

1. Only one splint is required for any typical fracture of the upper limb.
2. A gradual, painless, and sufficient extension is effected.
3. It is the ideal splint for field dressing stations. Once affixed, it need never be removed, as the rubber bands can be detached and sterilised daily.
4. The weight of the splint, with attachments, is only 1¾ lb.
5. It can be packed flat or in sections. By the latter method it can be sent by post in a cardboard box 12 × 9 × 1 in.
6. The entire splint can be sterilised and can at any time be placed in an arm-bath.
7. The comfort of the patient is enormously increased and pain is practically eliminated.
8. The nurse's work is reduced to a minimum.

This splint is a combination of three splints designed and used by the writer at the Barnet War Hospital, and the results there obtained emboldened him to seek a wider field. They have been tried and approved by the following surgeons, whose encouragement the writer would here wish to acknowledge: Colonel A. Carless, Eastern Command; Major E. Hey Groves, Beaufort War Hospital; Surgeon-General N. R. Howse, C.B., V.C., Australian Forces; Captain E. C. Hughes and Sir W. Arbuthnot Lane, Bart., Millbank; Mr. D. Ligat, Middlesex Hospital; Mr. V. Warren Low, St. Mary's Hospital; Colonel T. H. Openshaw, C.M.G., London Hospital. Special indebtedness is due to Major Hey Groves for the inspiration of the work and assistance in preparing this article; to Lieutenant H. T. Booker, R.E., for the drawings; and to Lieutenant W. Daunt, R.A.M.C., High Barnet War Hospital, for experimenting with the earlier models.

ON THE TREATMENT OF

RECENT GUNSHOT WOUNDS WITH BISMUTH-IODOFORM-PARAFFIN PASTE.

WITH SPECIAL REFERENCE TO COMPOUND FRACTURES.

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CAPTAIN, R.A.M.C. (T.F.);
AND
HAMILTON DRUMMOND, M.B. DURH., F.R.C.S. EDIN.,
CAPTAIN, R.A.M.C. (T.F.)

A LARGE number of cases have now been reported in which the bismuth-iodoform-paraffin paste (B.I.P.P.), introduced by Professor Rutherford Morison, has been employed with satisfactory results. These cases, however, have all been sent to England suppurating freely before this treatment was applied, and its use in recent wounds has not been reported. The writers wish to record their experience of the use of B.I.P.P. in recent wounds as encountered in a casualty clearing station and to advocate this method as a treatment for recently infected wounds in which suppuration is not yet fully established. They have been further encouraged by the report of Dr. Louisa Garrett Anderson and Dr. Helen Chambers on a large series of cases treated in England, for they say "the best results are obtained when B.I.P.P. treatment is applied soon after the man has been wounded." The danger of gas gangrene has deterred surgeons from employing the method at this early stage in wounds which are constantly infected with the various strains of organisms which produce gas gangrene. Fleming found in the bacteriological examination of 127 cases of wounds from one to seven days old *B. aerogenes capsulatus* (*B. perfringens*) in 103 cases, streptococci in 102 cases, staphylococci in 40 cases, *B. tetani* in 22 cases. He found also a variety of other organisms in 67 cases. In a series of 25 specimens, including missiles, fragments of clothing, pieces of excised skin and portions of resected muscle from wounds seen in this casualty clearing station within 24 hours of the receipt of the injury, the following organisms were found by Captain J. W. McNee and Captain J. S. Dunn in films and cultures: in 23 cases large bacilli of perfringens type; in 9 cases streptococci; in 1 case *Staphylococcus aureus*; in 1 case Gram-negative bacilli. In only one instance in which some fragments of cloth from a wound were examined by films and cultures was the result negative.

Advantages of Method and Technique.

The method rightly used has the following advantages:—

1. The wound can be closed by sutures, rendering prolonged drainage unnecessary, and in the great majority of cases there is no suppuration.
2. No change of dressings is required and much disturbance of the patient is avoided—a most important matter to freshly wounded men to whom rest is essential.
3. It greatly increases the facility and reduces the discomfort of transport. Apart from wounds of the viscera and central nervous system, the management of compound fractures presents the most difficult problem for the surgeon in a casualty clearing station, and it is in this class of cases that the writers have found the method particularly valuable.
4. There is no increased liability to the development of gas gangrene. On the contrary, it is diminished.

Technique.—The patients usually arrive in a filthy condition, encrusted with mud. The skin around the wounds, for now they are usually multiple shell, bomb, or grenade wounds, is cleaned with ether soap and rendered as surgically clean as possible. The part is surrounded with dry sterilised towels. Surrounding the entry and exit wounds there is always a margin of necrotic skin heavily infected with micro-organisms. This is removed by excising a ring of skin one-eighth of an inch wide. The wound is then freely opened up and all foreign bodies and loose pieces of bone are as far as possible removed. Further, all devitalised muscle is resected and bleeding points are secured with Spencer-Wells artery forceps. This resection extends not only to muscle which is obviously necrotic, but also to areas which are devascularised and non-contractile. It is in muscle in this condition that gas gangrene begins to spread. Although this procedure is most important, the writers have had long enough experience to know that in itself it is insufficient to prevent the subsequent development of obvious signs of infection in compound fractures. The raw surface

is then well swabbed with methylated spirit, and the B.I.P.P., consisting of 2 parts of iodoform to 1 of bismuth subnitrate with sufficient liquid paraffin to produce the consistency of Devonshire cream, is smeared all over the wound and the ends of bone with a piece of dry gauze. It should be well rubbed in to form a thin film on the surface, and care should be taken not to leave any excess. It is convenient to leave the ligaturing of bleeding points until this stage, as otherwise the ligatures are apt to be rubbed off. Gaps in muscle can be brought together with catgut stitches when necessary. The wound is then sewn up with interrupted fishing-gut sutures and a dressing of dry sterilised gauze is applied; this is covered with wool, and, if required, a splint is applied. In a favourable case the dressing need not be disturbed until the patient is evacuated to the base, as it is an invariable rule to examine the wound before the patient leaves. If the outer dressing becomes stained with discharge it should be changed without disturbing the gauze in contact with the wound. If the patient has to be evacuated immediately to the base it is advisable to insert the fishing-gut stitches, but to leave them untied or only loosely tied. They can then be tightened later on without fear of tension being caused in the wound by retained discharge. This applies particularly to very extensive wounds.

It will be observed that the writers have differed from the technique described by Professor Rutherford Morison in the free excision of damaged tissues, the reason being the liability to the development of gas gangrene in recent wounds containing devitalised muscle. Such muscle is highly dangerous and permanently functionless; consequently, no further damage is done by resecting it. Moreover, the belly of the individual muscle is frequently torn across, so that the muscle as an organ is rendered useless, unless it be sutured with catgut, which this technique renders possible.

Results of Treatment.

As a rule there is a general reaction following this procedure lasting from 24 to 48 hours. This is shown by an elevation of the temperature and pulse-rate. This soon subsides and there are no other alarming symptoms, so that the surgeon must not be deterred and tempted to examine the wound. Should, however, the wound be examined, it will be found in a favourable case that the edges present the signs of a mild inflammatory reaction, the evidences of which have disappeared by the third or fourth day. There is a discharge consisting of serum mixed with the products of decomposing B.I.P.P. It is not foul, but smells strongly of iodoform. The amount is roughly proportional to the area of the raw surface involved. Should the case not be progressing well, the general appearance of the patient is most suggestive, and there is pain and tenderness in the part affected, and when examined it is red and swollen. The temperature and pulse-rate remain high. This has only happened in two cases, one a shell wound of the thigh, the other a grenade wound of the wrist, neither of them being compound fractures. The symptoms and signs were unmistakable the day following the operation in each case; both cases recovered after opening up and draining the wounds freely. The failure was probably to be attributed to insufficient resection of damaged tissues. So far there have been no cases presenting signs of iodoform or bismuth poisoning, but care has been taken not to use an excessive quantity of B.I.P.P. nor to leave any lumps in the wounds.

The writers have used this method since September, 1916, but not continuously. A large number of compound fractures have come under their observation since that date which have been treated by various methods; but as they have found this method gives the most satisfactory results, they now use it exclusively in all compound fractures. They have found it valuable also where amputation has to be performed on account of severe laceration of the tissues; in such cases the stump almost invariably suppurates otherwise.

Illustrative cases.—The following short notes of five typical cases illustrate its use in compound fractures:—

CASE 1. *Compound fracture of left femur.*—Lance-Corporal W., wounded by a shell fragment at 10 P.M. on Feb. 17th, 1917. The entry wound was over the anterior aspect of the thigh at the level of the junction of the middle with the lower third, size of a two-shilling piece. The exit wound at the same level was 4 inches in length, situated at the back of the limb. Operation 12 hours later. The wound was freely opened up in front and non-contractile muscle and many fragments of loose bone were removed. The same was carried out through the posterior exit wound. The biceps muscle which had been completely divided across showed much laceration. The wound was well dried out with methylated spirit and B.I.P.P. applied. The muscles were brought into apposition with catgut sutures and the skin with silkworm gut. The patient made a straightforward recovery and went to the base on the seventeenth day after operation. The temperature on one occasion (fourth day) reached 102° F., after which time it came down to normal. The anterior wound was healed, and posteriorly, except for a sinus leading down to a bare area of bone, the wound was healing well. Bacteriological examination showed exudate from this wound containing streptococci and staphylococci.

Radiogram of Case 5, showing the appearance of the fracture after being treated with B.I.P.P.

CASE 2. *Machine gun bullet wound of right radius.*—Corporal B. was admitted to hospital at 2 A.M. on Feb. 28th with a wound of the right arm. The missile had entered just below the head of the radius and passed out at a point on the same level over the inner aspect of the limb. The forearm was very swollen and tender, and there was no pulse at the wrist. Operation 11 hours after injury. On laying open the wound the radial artery was found divided close to its origin; both ends of the vessel were ligatured and several fragments of bone which were completely detached were removed. The radius showed much comminution just below the head of the bone. Wound dried out with methylated spirit, gauze and the B.I.P.P. applied. The wounds were entirely closed without a drain. The patient left on the seventh day after the operation when he was dressed for the first time. Both wounds were healed by first intention. He was transferred to England on the fifteenth day after the operation quite healed and with the sutures removed.

CASE 3. *Rifle grenade wound of right radius.*—Private M., admitted to hospital on March 8th at 6 P.M. He had been wounded six hours previously. There was an entry wound in the outer aspect of the right forearm the size of a sixpence. The exit wound, which was larger and showed more destruction of the skin, was on the same level and on the inner aspect of the limb. Operation eight hours after injury. Both wounds were freely laid open and several fragments of bone were removed; the shaft of the radius, however, was not completely broken across. After following the usual technique the wound was completely closed in layers. The usual general reaction followed and patient left with a normal temperature and pulse on the fifth day. The entry wound was healed by first intention and the exit wound showed a small amount of blood-stained serum from one point, otherwise it was healed.

CASE 4. *Compound fracture of femur.*—Private, admitted on March 3rd suffering from a scalp wound and a compound fracture in the lower third of the right femur, due to shell wounds. Operation 12 hours after injury. The scalp wound was excised and sutured; this healed by first intention and the stitches were removed on the sixth day. The thigh wound was freely opened up and all foreign bodies were removed. Skin and torn muscle were excised. The raw surface was treated with B.I.P.P. and the wound sewn up. A Wallace splint with plaster extension was applied. The patient was evacuated to the base on March 12th, the wound being quite healthy, and Colonel Cuthbert Wallace, A.M.S., informed us on April 1st that he had recently seen the patient in a satisfactory condition in a base hospital.

CASE 5. *Compound fracture of humerus.*—Private, admitted March 22nd suffering from shrapnel wound causing compound fracture of surgical neck of left humerus. Operation 12 hours after the receipt of injury. A shrapnel ball was removed from the axilla by new incision. This was treated with B.I.P.P. and sutured. The wound of entry was excised and all dead tissue was cut away. The raw surface and bone ends were treated with spirit and B.I.P.P. in the usual way and the wound sewn up. Patient was sent to the base on March 26th. There was then no sign of any suppuration in the wound when it was redressed with gauze and spirit.

Conclusions.

1. The method is applicable to recent as well as to wounds several days old.

2. There is no increased liability to gas gangrene if care be taken to eliminate that danger by free incision of damaged tissue.

3. It is the simplest and most reliable method the writers have had the opportunity of employing of avoiding suppuration in infected gunshot wounds.

4. It contributes greatly to the comfort and well-being of the patient for the following reasons: (*a*) wet dressings and irrigations are avoided; (*b*) as the dressings need seldom be changed there is a minimum disturbance of the injured part.

References.—Rutherford Morison: THE LANCET, August 12th, 1916, p. 268. Louisa Garrett Anderson and Helen Chambers: THE LANCET, March 3rd, 1917, p. 331. Alexander Fleming: THE LANCET, Sept. 18th, 1915, p. 638.

THE HÆMOGLOBIN VALUE OF THE BLOOD IN SURGICAL SHOCK.

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IN a Memorandum recently issued by the Medical Research Committee (published in THE LANCET of March 31st) evidence is brought forward that shock, experimentally produced in animals, is usually accompanied by a considerable loss of plasma from the blood into the tissues. The loss of plasma not only diminishes the volume of the circulating blood but also renders it more concentrated, and the increased concentration is manifested by a rise in the *percentage* hæmoglobin value of the blood. The Memorandum also contains a reference to observations made in France by Captain Marshall, R.A.M.C., which support the view that loss of plasma into the tissues is an important factor in surgical shock in man.

Surgical shock in man, however, is frequently associated with considerable hæmorrhage; and, as is well known, the normal reaction of the body to hæmorrhage is the rapid absorption of fluid from the tissues into the blood. By this means the volume of the blood is more or less completely restored to its former level, although the blood becomes more dilute and its percentage hæmoglobin value is lowered. It seems probable that in a patient suffering from both shock and hæmorrhage the percentage hæmoglobin value of the blood represents the outcome of two opposing processes—namely, shock which tends to concentrate the blood and hæmorrhage which leads to dilution of the blood. Determination of the percentage hæmoglobin value in such a case ought to show which of these processes is predominant; a low hæmoglobin value may be regarded as indicating that the patient is spontaneously increasing the volume of his blood at the expense of his tissue fluids, whereas if the hæmoglobin value is approximately normal the physiological reaction to loss of blood is being counteracted by the tendency of shock to concentrate the blood.

We have recently had the opportunity of determining the hæmoglobin value of the blood in several cases of shock. The patients were injured almost simultaneously, and were admitted a few minutes later to St. Bartholomew's Hospital. Three hours later, when the hæmoglobin value of their blood was determined, four of the patients had lost a considerable amount of blood, and in three cases the hæmorrhage was not completely checked; all the patients showed well-marked clinical signs of shock. The nature of the injuries and the observations made on the blood are summarised in the table.

The hæmoglobin determinations in Cases 1–4 make it clear that the patients who recovered reacted to hæmorrhage by absorbing fluid from their tissues into the blood, and thereby restored the volume of the circulating blood. On the contrary, this compensatory process failed to take place in the patients who died from shock. Further, in Case 5, who had no hæmorrhage, the hæmoglobin value rose considerably above the normal figure. These cases are too few in number to justify any dogmatic statement as to the prognostic significance of the hæmoglobin value of the blood in surgical shock. It seems legitimate, however, to point out, first, that they entirely support the view that loss of plasma from the blood into the tissues is an important factor in shock; and, secondly, that they have a direct practical bearing.

The obvious inference from these observations is that, in shock accompanied by hæmorrhage, a normal or approximately normal hæmoglobin value indicates that the patient is unable to make up for the loss of blood by absorbing fluid from his tissues. In these circumstances the volume of his blood becomes inadequate for the carrying on of the circulation, and the intravenous injection of saline solution (preferably a hypertonic solution) is desirable at the earliest possible moment.

No. of case.	Man or boy.	Age.	Nature of injury, &c.	Hæmoglobin examination on same day.*		Result.
				3 P.M.	6 P.M.	
1	M	30	Compound fracture of tibia and fibula of both legs. Wound of right knee, involving the joint. Considerable loss of blood. Right leg amputated at seat of election 2.30 P.M. Hb sample taken immediately after the operation.	67	—	Recovered.
2	M	—	Both feet shattered; severe hæmorrhage. Both feet amputated approx. 4 P.M.	87	96	Died from shock 40 hours after injury.
3	M	—	Compound fracture of right ankle and considerable hæmorrhage. Superficial burns of arm and trunk. Amputation at seat of election at approx. 5 P.M.	92	—	Died from shock within 12 hours after injury.
4	B	17	Compound fracture of left tibia and fibula. Fracture of base of skull. Moderate hæmorrhage. No major operation performed.	62	—	Recovered.
5	M	—	Very severe deep burn of right leg and side; tissues charred to a depth of 1 in. Popliteal nerve exposed and partly burnt. No hæmorrhage.	108	94	Recovered

* In each case the injuries were received at 11.40–11.50 A.M.

At the time of the first hæmoglobin estimation none of these patients, except Case 1, had received saline injections; Case 1 had 1 pint saline per rectum between 2.30 P.M. and 3 P.M. Between 3 P.M. and 6 P.M. Case 5 drank several pints of fluid.

A DEVICE FOR INSURING SPONTANEOUS SEPARATION OF BLOOD CLOT FROM THE WALLS OF THE CONTAINING VESSEL.

BY A. D. GARDNER, M.D. OXON., F.R.C.S. ENG.

(*From the Department of Pathology, University of Oxford Standards Laboratory under the Medical Research Committee.*)

ONE of the chief difficulties that I, doubtless in common with many other workers, have experienced in the obtaining of serum from blood is the frequent refusal of clot to separate from the walls of the containing tube or cylinder. Many pathologists, it seems, have never been troubled by this difficulty; others, however, have. For instance, Lord Lister, as quoted by Sir W. Watson Cheyne,[1] observed that if blood be drawn aseptically into a glass vessel sterilised by heat the clot which forms does not contract and squeeze out serum. But, on the other hand, in reply to this quotation, Wright states that[2] "the whole of the serum industry depends on the fact that blood when drawn into a vessel which has been sterilised by heat *does* contract and squeeze out serum."

Thus we have apparently a disagreement between two very eminent observers upon one of the commonest laboratory phenomena. Lister's unqualified statement would meet with little support from workers who have had any consider-

[1] British Journal of Surgery, 1916.
[2] THE LANCET, Sept. 16th, 1916, p. 507.

able experience of serology, for blood clot is at least quite frequently found to separate and contract properly in glass vessels sterilised by heat. On the other hand, Wright's statement, which suggests that there are few or no exceptions to the rule that such clot does separate and contract, is not in agreement with my own experience. Dudgeon, Gorbett, and Bawtree,[3] in describing the preparation of human serum, say that separation of clot and expression of serum take place in a few hours in sterile glass vessels. They mention no exception to this rule. I may observe in this connexion that my own experience of serological work at St. Thomas's Hospital was in full agreement with their observation, for I can hardly remember a single case of failure of separation while I was working there. In my present laboratory, on the other hand, about five out of every six specimens of human or animal blood fail to separate and contract in a satisfactory manner after coagulation. It makes no difference whether the glass vessels are finally washed with distilled or with tapwater before dry sterilisation; and I have been quite unable to find any reason for the difference. Professor G. Dreyer has suggested that it may be due to the fact that the blood specimens in this laboratory come, in a great majority of cases, from inoculated men and animals, while those that I remember at St. Thomas's were nearly all from normal individuals.

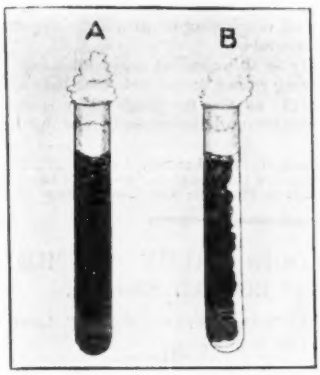
When a specimen of blood has been allowed to coagulate and the clot has been left to contract, but no satisfactory contraction has taken place, then it becomes necessary to use some sort of force to separate the clot from the walls of the vessel to which it remains adherent. But the use of force, entailing as it does the introduction of a glass or metal rod into the vessel, is objectionable. For it is impossible to separate the clot thus without breaking it to a certain extent and liberating a sufficient quantity of hæmoglobin to cause some pink or red colouration of the serum. Moreover, the opening of the vessel for this manipulation affords an extra chance that the serum may become spoiled by bacterial contamination.

These considerations, combined with the vexatious delay in the preparation of serum that results from a failure of clot separation, make it desirable to adopt some procedure which may insure the automatic separation and proper contraction of the clot and render mechanical interference unnecessary. The following simple method which was devised for the purpose has given uniformly satisfactory results over a period of six months.

Method.

Into the tubes or cylinders which are to receive the blood a small quantity of melted saline agar is poured. For an ordinary test-tube 1·0 c.c. is ample. The agar is a 1½ per cent. solution in 0·85 per cent. NaCl solution. No alkali is added. The tubes are then plugged and sterilised in the autoclave. Shortly before the tubes are to be used the agar is melted by immersing the lower end of the tube in boiling water and the melted agar is allowed to run up the walls of the tube, so as to coat them with a thin film. The excess of agar may be allowed to run back to the bottom of the tube or, if it be considerable, it may be poured away after removal of the plug.

Either the whole of the inner surface of the tube may thus be coated or there may be left uncoated a longitudinal strip, running from the mouth of the tube down some three-quarters of its length and having a width of about one-third of the circumference of the tube. In the former case the whole clot will detach itself from the glass, and either sink to the bottom or remain suspended by delicate attachments at its upper pole. In the latter case the clot will almost always adhere firmly to the uncoated strip of glass while separating everywhere else. The serum which separates out is practically always free from any visible trace of hæmoglobin, and it may be left in contact with the clot for several days without acquiring a pink tinge. The coagulation of the blood appears to be slightly delayed by contact with agar, and the quantity of serum obtained in a given time is usually rather less than in the case of a perfect automatic separation from a plain glass surface. But both these disadvantages, in themselves not important, may, if desired, be counteracted by placing the tubes in the incubator at 37° C. for one or two hours after collection of the blood. If this has been performed aseptically the high temperature will do no harm. Once coagulation has taken place separation and contraction occur with striking rapidity. The action of the agar film appears to be purely mechanical. The clot adheres firmly to the film and the serum which first exudes from the clot filters through the film or passes through cracks in it and separates the film from the wall of the tube. The adhesion of the agar to the clot is often clearly to be seen at the lower pole of the clot when a plug of agar has been left at the bottom of the tube; for the plug can be seen capping the lower pole of the clot and drawn up by it away from the floor of the tube. The appended drawing shows the results of allowing two portions of the same specimen of blood to clot (A) in an ordinary sterile glass tube, (B) in an agar film tube. The drawing was made after 24 hours. The control tube shows a complete absence of separation of the clot, while the agar film tube shows a separated and well-concentrated clot adherent to a part of the tube that has been intentionally left uncoated.



The question arises whether the serum is in any way affected by contact with the agar film. I can only say that experience has not led me to suspect any deleterious effect of the agar film on agglutinating serum. I have found by experiment that there is no determinable difference between the agglutinin titres of two specimens of the same blood when the one has clotted in an agar-lined tube and the other in a plain glass tube. But this is a point which would need to be taken more carefully into consideration when using this method in the production of therapeutic sera.

Gelatin has a very similar effect upon the separation of blood clot. In fact, it is in some respects better than agar. For instance, gelatin-lined tubes do not so often show an untidy "shreddy" clot as do agar tubes and the coagulation and separation are usually more rapid. But gelatin has the disadvantage of a low melting-point, which makes it a less convenient substance to deal with in hot weather and forbids the incubation of tubes, should this be desired. Moreover, there is at least a theoretical possibility that some digestion of the gelatin by tryptic ferments in the serum may occasionally take place. These considerations have led me to adopt agar in preference to gelatin for routine work.

Experiment to show the Percentages of Serum Obtained after 48 Hours, without Manipulation, from Ox Blood in Variously Treated Tubes.

—	Percent. by vol. of serum obtained. Total.	Percent. by vol. of serum from each of 4 tubes	—	Percent. by vol. of serum obtained. Total.	Percent. by vol. of serum from each of 4 tubes.
Saline agar tubes.	36·7	34·1	1% peptone gelatin tubes.	40·0	37·5
		37·5			39·6
		32·6			38·6
		38·0			40·5
1% peptone agar tubes.	38·0	37·2			
		36·9			
		39·1	Nutrient gelatin tubes.	38·4	37·0
		38·6			38·6
Nutrient agar tubes.	37·0	36·9			38·6
		36·0			39·1
		36·0			
		39·1			
Saline gelatin tubes.	40·0	41·3	Plain glass tubes.	20·6	37·2
		39·6			25·0
		38·6			2·2
		40·5			*19·6

* The clot in this tube had hardly separated at all; it was mechanically separated half an hour before the test.

The above table shows the quantities per cent. of serum obtained (without manipulation) from ox-blood which had been allowed to coagulate in a number of tubes treated in various ways. A glance will show that the quantities obtainable from tubes treated with three different kinds of agar and three different kinds of gelatin are very similar one to another, and that there is a considerable degree

[3] THE LANCET, August 19th, 1916, p. 315.

of uniformity in the percentages from the individual tubes. On the contrary, from the plain glass tubes a much smaller total percentage of serum was obtained (and this would have been even more striking had not the clot in one of these tubes been separated by manipulation about half an hour before the serum was drawn off). Moreover, the great irregularity of the percentages from the individual tubes—ranging from 37·2 per cent. to 2·2 per cent.—is in clear contrast to the uniformity secured by the agar or gelatin film.

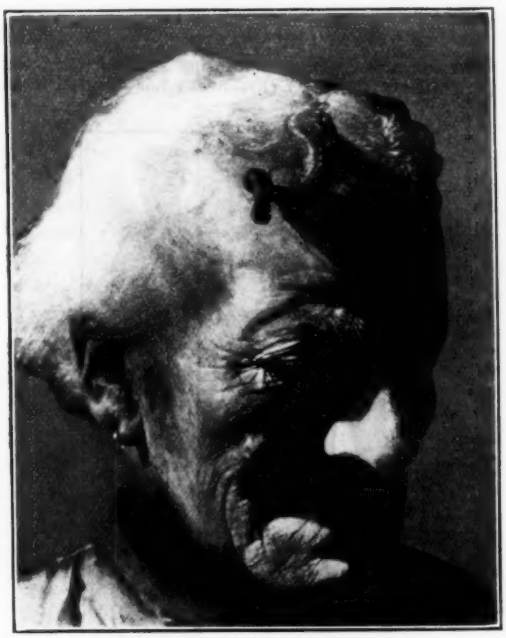
Summary.

The spontaneous separation of blood-clot in glass vessels, and a uniform yield of serum, may be insured by coating the inner surface of the vessel with a thin film of agar or gelatin. For general purposes agar is to be preferred.

A SEBACEOUS HORN.

BY OSWALD VEVERS, M.R.C.S., L.R.C.P. LOND.,
ACTING MEDICAL SUPERINTENDENT, LAVERSTOCK HOUSE ASYLUM.

AN uncommonly well-developed sebaceous horn, the length being 4¾ in., the diameter at base ¾ in., is shown in the accompanying photograph. The spiral shape, site, and general appearance produced a striking resemblance to a ram's horn. The patient, a married woman, was admitted to Bucks County Asylum, suffering from delusional insanity, in September, 1916. During the daytime she was wont to conceal as much of the growth as possible by means of tufts of false hair, from which the free end of the horn protruded in a disturbing manner. The tip was freely movable through about two inches, without causing pain, the whole horn



Photograph showing the sebaceous horn.

moving *en masse* and being inalterable in form by even very considerable force. On grasping the base firmly movement could be elicited over the subjacent frontal bone, but the scalp here was not so freely movable as usual. Mr. L. W. Reynolds, of High Wycombe, informs me that he removed a similar growth from the patient's scalp eleven years ago, and that it "recurred a year later and then broke off," and continues, "whether it is associated with mental disease I cannot say, but the picture in Treves's book has a somewhat demented look about it." It would be interesting to know if any connexion has been traced.

I wish to express my thanks to the medical superintendent, Dr. H. Kerr, for permission to publish the case, and also to Mr. Reynolds, the patient's medical adviser.

Reports and Analytical Records
FROM
THE LANCET LABORATORY.

"CHEVALIER" MALT FLOUR.

(TUCKERS AND BLAKES, LIMITED, ASHLEY-ROAD MALTINGS, BRISTOL.)

THE analysis of this flour was as follows:—Moisture, 10·20 per cent.; maltose, 25·21 per cent.; dextrin, 13·04 per cent.; starch, 31·2 per cent.; protein, 15·75 per cent. (nitrogen = 2·50 per cent.); fat, 1·60 per cent.; mineral matter, 3·00 per cent. (containing 0·80 phosphoric acid). It will be seen that the diastasic process has been well carried out, the starch being largely converted into soluble dextrin and maltose. The flour still showed some diastasic activity. The reaction for enzymes was well marked. The flour was practically free from irritating husk. It has a pleasant malty flavour, and there can be little doubt of its nutritive value and easy assimilability. It mixes with milk very well, forming with it a sustaining and palatable liquid food, suitable for invalid and infant requirements.

CHLOROGEN.

(ARTHUR HYAMS AND CO., LIMITED, 10, ESSEX-STREET, STRAND, LONDON, W.C.)

Chlorogen is described as a water-sterilising solution containing di-basic hypochlorite prepared by Nesfield's process, and is intended for both military and civil use. It is a colourless fluid with chlorous odour. It is decidedly alkaline to litmus paper, the colouring matter of which it rapidly bleaches. On adding a solution of potassic iodide to chlorogen iodine is at once liberated. It is practically free from lime, but contains sodium salts. A marked chlorous odour is developed when it is added to water, 1 drop of chlorogen in 1 gallon being stated to give 1 part of chlorine in 1,280,000 parts. The powerful bactericidal action of chlorine so developed is familiar to all. The chlorine equivalent of chlorogen is well preserved.

COCOA AND MILK POWDER (SWEETENED).

(CADBURY, BOURNVILLE.)

This powder affords a very ready means of preparing a sustaining and nourishing beverage according to the manner directed. We found, as evidence of milk powder being present, 10·28 per cent. of milk sugar. The total amount of materials soluble in cold water was 72·5 per cent., which consisted largely of cane sugar. The total fat amounted to 12 per cent., the mineral matter to 2·50 per cent., nitrogen to 2·12 per cent., and moisture to 1·60 per cent. The flavour is attractive, being partly due to the full cream milk powder employed and partly to the cocoa, but, of course, the powder is decidedly sweet, owing to the cane sugar present.

LIQUOR UNOLINE.

(W. E. LOWE AND CO., LIMITED, 8, STAFFORD-STREET, OLD BOND-STREET, LONDON, W.)

This fluid has been prepared in accordance with a suggestion made by the late Sir Lauder Brunton some years ago that the mineral matters obtained by incinerating willow charcoal might give a more effective salt for medicinal purposes than when the ordinary potassium salts are employed. The salts in the willow charcoal are converted into nitrate by treating their solution with calcium nitrate, when presumably calcium carbonate is thrown out. The preparation has been credited with giving good results in rheumatism and neuritis, and particularly in arterio-sclerosis. On evaporating the "liquor" to dryness we obtained a clean crystalline residue made up chiefly of potassium nitrate, one-half fluid ounce (the usual dose) containing approximately 1 gramme of the salt.

TABLOID HALAZONE (0·004 GRAMME).

(BURROUGHS, WELLCOME, AND CO., SNOW HILL BUILDINGS, LONDON, E.C.)

Halazone is a chloramine derivative associated with a sulphonic and a benzoic group—*p.* sulphon-dichloro-amino-benzoic acid. It was recommended in a recent report to the Medical Research Committee as a most

efficient disinfectant for drinking water. The tabloid halazone dissolves readily in water and develops a chlorous odour. The solution is alkaline and shows marked bleaching properties and easily sets free iodine from potassium iodide solutions. It leaves no unpleasant taste in the water and each tabloid is sufficient to sterilise a litre of ordinary water, but when the water is suspicious the addition of two is recommended, and contact should be allowed to take place for 40 minutes before the water is consumed.

(1) "PATENT" GROATS; (2) "PATENT" BARLEY.

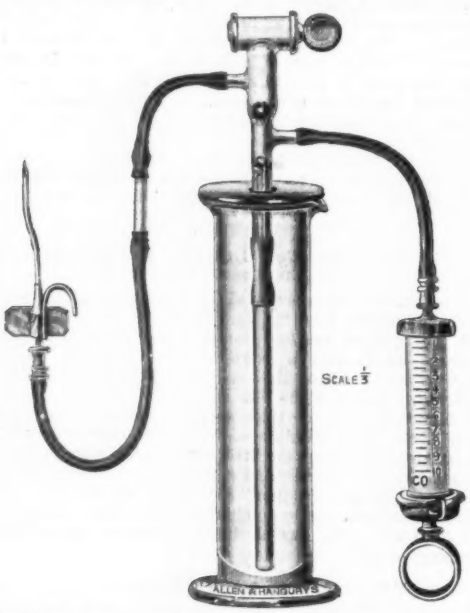
(KEEN, ROBINSON, AND CO., LIMITED, LONDON.)

1. "Patent" groats contain a maximum amount of the nutritive constituents of the oat, while all irritating husk is removed. They are rich in both protein matters (11·7 per cent.) and mineral salts (1·7 per cent.). The special method of manufacture renders them a useful adjunct with milk in infant and invalid feeding. Their value in this respect is most probably assisted by the presence of vitamines and enzymes. 2. This last observation applies also to "patent" barley, which occurs as a fine flour. Barley, of course, contains about half the amount of proteins and fat present in oats, while the easily assimilable starch of barley reaches the figure of 81·5 per cent., the oat freed from husk showing 74·3 per cent. The uses of barley flour both as a beverage and for special dietetic purposes in infant feeding are well known. The starch of barley flour seems more readily digested than that of some of the cereals.

New Inventions.

AN APPARATUS FOR THE INTRAVENOUS INJECTION OF SALVARSAN.

IN view of the increasing importance of modern antisyphilitic remedies, in the use of which so many medical men are now receiving instruction, it is greatly to be desired that the apparatus employed in such treatment should be of the highest attainable grade. I became familiar with Professor Welchmann's apparatus whilst working at the Virchow Institute, Berlin, but further experience in its use



disclosing several weak points I devised the modification, a sketch of which is appended. In practice I have found it very satisfactory.

The essential parts of the apparatus are the two ball-valves (see illustration), the seating of which must be perfect. The function of the upper valve is to prevent blood being drawn from the vein when the piston of the syringe is withdrawn, whilst the lower valve prevents the return of the solution to the receptacle which contains it. The syringe should be filled with solution once or twice and emptied so that all air is expelled. When this has been done, the tube, which has a metal male portion, should be inserted into the socket of the needle. The piston of the syringe should then be drawn in and out until the required quantity of solution has been injected into the vein. The apparatus is easily sterilised by boiling and it is sufficiently portable to be carried in an ordinary inside coat pocket. In the sketch a glass cylinder is shown, but any kind of receptacle can be employed, such as a tumbler, &c. The quantity of fluid to be injected can be accurately gauged within wide limits. For instance, if 600 c.c. of salvarsan solution is prepared in a large glass flask 100 c.c. can be injected into six patients by simply changing the needle each time. A special advantage in the construction of the needle is that after insertion into any vein it will rest on the arm parallel with the surface. When working alone the instrument can be easily manipulated, one hand being kept on the needle, whilst the other is used by means of the ring in the piston rod, to work the syringe. I have found this form of needle preferable to any other pattern, both for entering the vein and for remaining in position after insertion. In the course of my work as pathologist at Netley I had to inject salvarsan into many dark-skinned soldiers (Indians), whose veins are difficult to see, and this form of needle then proved very useful. The apparatus can also be employed for the injection of saline solution.

Messrs. Allen and Hanburys, Wigmore-street, W., are the makers.

Knightsbridge. M. J. ROWLANDS, M.D. Brux., M.R.C.S.

A CRUTCH-LIMB.

FROM his experience as consulting surgeon to an army corps Professor v. Baeyer (Ettlingen) has evolved a very

simple form of prosthesis[1] for amputations of the leg, which may be regarded as something between a crutch and an artificial limb. He calls it a "seat-stick," but probably the compound word "crutch-limb" will suggest the device better to the English reader.

The crutch-limb consists of a stick expanding above into a flat board, to the top of which two girdles are attached, a pelvic and a shoulder, both of adjustable length. The illustration sufficiently shows its method of application. The device leaves both hands free, and avoids the necessity of axillary support with its dangers of nerve compression. Professor v. Baeyer states that the crutch-limb has become highly popular in his orthopædic reserve hospital.

[1] Münch. med. Wochens., 1917, i., 829 (Military Supplement).

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AMBRINE

(Method of Dr. BARTHE DE SANDFORT.)

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SUPPLIED TO:—The British Navy, French Ministry of War and Marine, The French Red Cross, The Italian, Belgian, and Roumanian Governments, The French Railway Companies, The Carnegie Trust Company, U.S.A., &c.

INDICATIONS for the Use of AMBRINE:—

BURNS	CHILBLAINS	VARICOSE ULCERS	NEURALGIA	SCIATICA
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The BRITISH MEDICAL JOURNAL, Sept. 2nd, 1916:—

Re AMBRINE TREATMENT.

"..... The primary and quite incontestable advantages of the treatment are two: it is agreeable to the patient, because entirely painless; it is convenient to the surgeon, because easily and quickly applied. ..... It is possible that the treatment would be useful in dealing with ordinary ulcers, and in any case it is certain that the study of its application to the raw surfaces is worth pursuing. ....."

THE LANCET, June 10th, 1916:—

THE VALUE OF AMBRINE IN THE TREATMENT OF WOUNDS.

"Attention is being drawn to the remarkable success of the Ambrine Wax treatment now being used at the Hôpital St. Nicolas at Issy-les-Moulineaux for burns, frozen feet, and all wounds where the tissues have been so damaged as to exact great length of time and considerable disfigurement in their restitution by the usual means. The Minister of War, in reply to the deputy M. Mons as to why, in view of the marvellous results obtained by treating burns and frost bites with Ambrine at the Hôpital St. Nicolas, all the soldiers suffering from such wounds were not sent there, stated that this was being done as far as possible. ..."

With AMBRINE treatment no waste of the material takes place—sufficient only being prepared for each application as required.

The SCIENTIFIC TREATMENT of HAY FEVER & allied ailments.

KINECTINE

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THE LANCET.

LONDON: SATURDAY, JULY 14, 1917.

Air Raid Psychology.

IN certain schools of biological thought a favourite theme is the phylogenetic adaptation of the organism to repeated sense stimuli of a given type, whereby appropriate reflex action, by way of defence or otherwise, is installed. By thorough-going exponents of these views it is held that since high-velocity projectiles are a recent development in warfare the sense organs have not become adapted to such stimuli, hence they cannot react; in other words, wounds thus produced are painless, at least at the moment of contact. Aerial bombardments of crowded cities are a still more recent development of "civilised" warfare, and, *ex hypothesi* the individual must be even less adapted to such stimuli than in the former instance. What, then, of his behaviour at such moments? Any thoughtful consideration of the subject will lead to the conclusion that various psychological factors are involved and that a distinction may be drawn between the response of the individual and that of the crowd. Man is still largely an instinctive animal and only a little bit reasonable; his intelligence may point the better way but innate trends may prevent his following it. Instincts have different strengths in different individuals and different races, yet probably the most general and the most powerful is that of self-preservation. This is called into being by the emotion of fear, and tends to express itself either in flight or in concealment, or both. The more unusual, strange, unfamiliar the exciting stimulus, the more overpowering is the instinct likely to prove—*Omne ignotum pro magnifico* is a very old saying, but also a very true one. When, therefore, without warning, a bomb drops from the blue in a crowded thoroughfare to dash for the nearest shelter is as instinctive an act as for the puppy to hunt the first rabbit that crosses its path. Further, what is strange also excites the instinct of curiosity, which, once aroused, may come into conflict with the other instinct; and recent experiences undoubtedly go to prove that at its bidding the individual may brave the risk and ignore the call of self-preservation.

But other psychological factors, other psychical stimuli, come into play and jostle each other for possession of the final common path that leads to action. With increasing knowledge our behaviour becomes more and more rational; and, after the first momentary instinct to flight, a glance at the sky may reveal the reassuring fact that the bomb-droppers are not directly overhead, and at once the stream of action is determined in another direction. Or the individual may have run the gauntlet on a previous occasion and, profiting by his experience, ignore both fear and curiosity. The citizen who hears the cry of "Zeppelins!" and turns over muttering, "I wish they'd let me sleep," is not acting in a spirit of bravado, but according to a psychological law. Further, anger or pity is an emotion that may oust fear or curiosity and determine the individual's conduct. And yet again, what of such stimuli as self-control and sense of duty? Whatever the policeman's first instincts may be, no one who has seen him directing the current of humanity to safety at these anxious moments can doubt the motives which actuate him. The crowd, however, as has been acutely pointed out by GUSTAVE LE BON, is something more than a congeries of individuals. It is apt to be swayed by certain stimuli, just as it possesses certain psychological characteristics, to which the individual is a stranger. A crowd is apt to be impulsive, mobile, unstable; in it the heterogeneous is swamped by the homogeneous. Fear may be felt by the individual, but panic is a crowd-phenomenon. On the other hand, crowds may exhibit praiseworthy features, may demonstrate the ruling activity of virtues, whose rôle in the behaviour of the individual may be less easy to detect. Above all, what has often been regarded as a fundamentally important factor, that of race, is seen *par excellence* in the response of the crowd to stimuli of the character that we have become familiar with since the outbreak of the war. From a psychological viewpoint it is instructive and not a little entertaining to glance over the comments of the lay press after such experiences as have recently been ours in London. It may be remembered that after the raid of Sept. 2nd, 1916, when an enemy airship was brought down in flames, a daily paper next day described the sight as "beyond doubt the greatest free show that London has ever enjoyed." No doubt thousands, who had satisfied themselves that they at least were safe, positively "enjoyed" the whole thing, and forgot the acute mental distress and anguish of the actual sufferers of the raid. Sometimes anger is uppermost, as when a well-known writer declares the mothers of England "will not long consent to sit silent with their arms tied behind their backs." Another publicist, irritated at the frequency with which the "calm" of the public is insisted on, candidly protests, "It is only oysters who are not rather frightened when bombs are dropping round." There is no inconsistency in these varying comments, all of which are fair.

A large out-patient department of a hospital serving a raided district is an excellent place in which to learn what the effects on the attacked population really are. From this experience, more than once repeated, we believe in the traditional British phlegm, and we think it no exaggeration to assert that our public, as a whole, is calm and its conduct exemplary. He would be rather less than human whose heart does not beat more quickly when the guns indicate the proximity of the invader, and in the bombed areas there are many whose state of nervous fear is not far removed from the "shell shock" of the firing line. Between these, whose temperaments are of a nervous type, and others who, even in the danger area, may pride

themselves on their sangfroid and nonchalance, there remain the crowd of our fellow human beings animated by a diversity of instincts and motives, and pursuing a course determined by that stimulus which may attain the final common path and blossom into action. How different these psychical stimuli are we have sufficiently indicated, and how well, on the whole, reason has prevailed we are proud to record. We made a brief investigation into the demeanour of the inmates of the metropolitan hospitals during the last and severest air raid on London. A summary of this will be found on another page,[1] and shows that the hospital patients, obviously susceptible material to sudden shock, under good supervision remained calm. Nor do medical men hear much of subsequent apprehensiveness, sleeplessness, reaction in the form of fatigue, collapse, or breakdowns. Some of us know of the fits, hysterical and epileptic, that take on a fresh development, the strokes of paralysis from excitement, the heart failures, the acceleration of latent pathological processes, but these have not been common occurrences. And in the great majority of our fellows we believe the evidence before us shows their demeanour under stress to have been unimpeachable, and to augur well for whatever days of trial may yet be in store.

War Bread.

THE Ministry of Food have dealt frankly with the criticisms that have appeared lately as to the unpalatability and indigestibility of war bread—the former is admitted and the latter is not denied where baking has been faulty. We learn from an authoritative source that applications are reaching the Ministry of Food for permission to use pure wheat flour. Up to the present date the numbers of these applications have not been large, but they may grow to such an extent that more careful scrutiny will have to be made before granting them. The medical profession will render the country an undoubted service in cöoperating with the Ministry of Food to prevent an abuse of the privilege. In appealing to them to do this it may be pointed out that complaint is by no means general, the applications coming in much larger proportions from certain districts than from others. Thus Hampshire, Yorkshire, Lancashire, Lincolnshire, and Cornwall furnish 64 per cent. of the total number of applications from England, with less than one quarter of the total population.

A committee of scientific experts have instituted, at the instance of the Food Controller and by arrangement with the Wheat Commission, a series of experiments on the digestibility of war bread and the advantage of milling to various standards. The experiments are not complete, but we may look for an improvement of conditions as a result of the work. The Ministry of Food admitted at a press conference held in Grosvenor House on Tuesday last that certain millers have not yet succeeded in properly adapting their equipment to the existing orders, with the result that badly made flour has been used in certain districts. On the other hand, most of the mills have overcome the difficulties which at first presented themselves, and are now producing good and wholesome flour from mixed grain. War bread has not yet become a uniform commodity; but that it has been produced in enormous quantities in many districts with differing populations, and without a complaint arising, shows that the system of obtaining a palatable and digestible war bread merely awaits further development. The rapidity of this development will largely depend upon the attitude of the miller and baker, and when these important persons follow intelligently the directions supplied them for producing a good flour and bread respectively from mixed grain, then a food that is good both in texture and condition may well be hoped for. It must be admitted that both the miller and the baker have considerable difficulties to contend with in the production of palatable bread which will keep under present conditions. To the miller is set the problem of producing from maize and other cereals, with, in many cases, imperfect machinery, grades of flour which will blend satisfactorily with wheat, and flour containing more of the outer part of the grain than formerly. To the baker is set the problem of baking bread from a composite flour which differs in properties from that which he has been accustomed to handle. On the whole, both the miller and the baker have met these difficulties remarkably well, and there can be little doubt that, with further experience, the troubles will be completely overcome. That a palatable and nourishing bread can be produced which complies with the orders of the Ministry of Food is quite certain. The importance of this statement cannot be over-estimated: it is a confident message from those who know, and may be accepted at its face value. And the message means nothing less than this: the nation can be saved from bread famine by complying with the directions laid down and the precautions taken. The fact is well worth bearing in mind by those who are tempted to grumble. The suggestion is not that *half* a loaf but that a *whole* loaf is better than no bread at all. Such a change in the composition and texture of our daily bread as is enjoined by the orders of the Food Controller was bound to lead to dissatisfaction in many quarters, but every endeavour is being made to minimise the sacrifice which, to some extent, the consumer is asked to make. As time goes on war bread will improve rather than deteriorate; the further attention given to the special requirements of its preparation will assuredly have good outcome.

Questions like ropiness, mouldiness, staleness, and hardness of certain war breads are all being rapidly and seriously dealt with by competent experts. In the meantime no uneasiness need arise. Ropiness, for instance, is a fermentation due to a bacillus parasitic on grasses, and quite harmless to man or other animals. With the coöperation secured of the miller and baker, no reasonable ground for complaint can arise, while it should be a source of satisfaction that a general acceptance of war bread means robbing the enemy of a weapon

[1] See p. 59.

which he appears to look upon as infallible. The complaints received very largely reflect the fact that this is the third year of an unprecedented war. The country is in a state of siege and the supply of wheat is not enough to provide all the bread needed. Admixture of other cereals less adapted than wheat to bread-making is an actual necessity of the country, and one of the most serious responsibilities of the medical profession is to assist the administration by checking the flow of uncalled-for complaints. The relation of Government regulation bread to the health of the community is under the earnest consideration of a committee of the Royal Society.

Annotations.

"Ne quid nimis."

MENTALLY DEFICIENT OFFENDERS.

THE Report of the Howard Association for 1916 calls attention to the large proportion of physically and mentally deficient persons now in prison, and quotes from the Prison Commissioners' Report for the same year the statement that "one of the notable effects of the war on the prison population has been that the receptions are now, for the most part, confined to the physically and mentally weak." Seeing that the male population of the prisons is less than one-half of what it was the year before the war, the existing proportion of defectives is, of course, easily accounted for. Probably but few of the floating population of men of military age who in times of peace inhabit the local prisons for more or less short periods have not either volunteered or been recruited when deemed fit for military service of some kind. As regards the "mental defectives," there are doubtless many more of this class in prison, both now and before the war, than the 204 who were stated by the Prison Commissioners in 1916 to have been certifiable as such under the Mental Deficiency Act. Commenting on these facts, the Howard Association pertinently asks: "Why is it that mentally defective offenders are admitted to prison at all, and what is the use of certifying them as mentally defective if they are to be released, as was the case last year?" And the Association correctly replies to these questions that "it is the law of the land, and that there is nowhere else than prison for these offenders to go." The remedy, or at least an initial remedy, for this undeniably deplorable state of things, now suggested by the Howard Association, is that some of the prisons which have been closed or otherwise used during the war should be devoted to the segregation of mentally defective prisoners, in the interests of society and of the half-witted individuals themselves. We think that this suggestion involves a total misconception of the existing difficulty. As long as institutions properly adapted for the segregation, cure, and employment of mentally defective persons are unavoidable it would be worse than useless to transfer the patients at this time to small prison buildings—for it is mainly the small prisons which are empty—where nothing could be done for their benefit. No possible good of any kind could result beyond the convenience of confining them until suitable places were found for them. Such prisoners would be far less better off than they are now, and the suggested scheme could not be tolerated with only the general welfare of society in view. At present all that has been done, since the passing of the Mental Deficiency Act, for the care and control of mentally deficient offenders who are unfit for prison discipline is the establishment of an institution for women only. The Board of Control, which is now responsible for carrying out the provisions of this Act, has not as yet supplied accommodation for male defective offenders, although, even before the war, a prison which could have been rendered approximately suitable for a time was placed at their disposal by the Prison Commissioners. It may be said here, also, that before the passing of the Mental Deficiency Act the prison authorities made several endeavours to minimise the re-admissions to prison of mental defectives by informing the local police of all such prisoners discharged into their districts, in order that they might be brought before the notice of the local authorities and appropriately dealt with when found to be uncared for; but practically no regard was taken of such information. It seems to us that the prison authorities, who were among the first to press strongly on the Government more than 12 years ago the necessity for legislation in order to provide for proper care and control on discharge of prisoners who were found quite unable by reason of mental defect to shift for themselves, should not be saddled with the responsibility of directing asylums for either the mentally or the physically defective. Whether wisely or not the law has apportioned this duty to a Board of Control mainly composed of the former members of the Lunacy Commission, and it is rather for this Board than for the Prison Commission to make reply to the questions asked by the Howard Association.

THE TREATMENT OF SCIATICA BY APPLICATION OF STRONG HYDROCHLORIC ACID.

Dr. Harrington Sainsbury has described in THE LANCET of June 16th remarkable results from the treatment of neuritis, and particularly of sciatica, by the application of strong hydrochloric acid to the skin along the line of the inflamed nerve. He ascribes the treatment to Dr. Hugh Wingfield, but we may point out that it is not new and was noticed in our columns nearly 20 years ago[1] in an annotation on an article which was published in the *Semaine Médicale*. We may recall the circumstances, as this valuable remedy seems in the interval to have been almost completely forgotten. Moreover, the manner of its discovery is interesting. This was due to an accident founded on a blundering ignorance of chemistry. A man who had suffered for many years from sciatica was treated in an Algerian hospital by hypodermic injections of salt and water, but without much success. After he had left he bethought him that perhaps the salt was not strong enough and that a stronger preparation of salt might be successful. He therefore procured some "spirit of salt" (strong hydrochloric acid) and painted it on the skin. He got rid of his long-standing trouble in a few days. Shortly afterwards he attended the hospital for some other affection, and confided in Dr. Bourlier, professor of therapeutics, whom he saw, how he had got rid of his sciatica. Dr. Bourlier thought the plan worthy of trial, and employed it in several cases with invariable success.

[1] THE LANCET, Nov. 20th, 1897, p. 1338.

A thesis was then published on the subject by Dr. C. Gennatas, of Montpellier, on the basis of a dozen cases of sciatica, all of which were completely relieved by this means. As far as we know, only one paper on the subject has been published in this country. After the appearance of our annotation Mr. R. A. Bayliss reported 16 cases of sciatica treated by application of hydrochloric acid over the course of the sciatic nerve.[2] In most instances they had defied every other treatment. Two patients were completely cured, 11 were considerably relieved, and 3 did not improve. He also treated 10 cases of intractable pain in the heels and plantar region, the sequelæ of acute rheumatism, many being gonorrhœal. Four of the patients were quite cured, 1 was very much relieved, and 5 were not improved.

A DEFENCE OF HYPO-NUTRITION.

AN impartial study of the effect of lowered nutrition on a large unselected population would be of great interest at any time, and especially now when the food blockade is a recognised form of warfare. At a recent military-medical meeting in Berlin Professor Klemperer summarised the results of some hospital observations, probably made at the Moabit Hospital, of which he is director in peace times. No one, he says, need feel ill merely because he is thin, since a loss of 10–20 per cent. of his peace-time weight is normal. Except to manual labourers a reduction of the musculature makes no matter. Per head of hospital population not more than 1500 calories are available, amongst which milk and eggs are still included, but practically all diseases heal without delay, even when the protein intake is diminished. Professor Klemperer goes on to consider war bread. Made with 94 per cent. of flour containing much gluten it is tolerated by a surprisingly large number; even the cellulose is utilised in consequence of the formation of new intestinal ferments. The increased vitamine intake has resulted in a vigour new to many folks and a corresponding disappearance of constipation and neurasthenia. Gout and diabetes have also greatly diminished. On the other hand, Professor Klemperer noted an increased severity in the cases of tuberculosis coming up as out-patients, many of whom had seen active service, and also in affections of the blood-vessels owing to the physical and mental strains of warfare.

THE PARASITOLOGY OF PYORRHŒA ALVEOLARIS.

IN recent years the clinical effects which are supposed to result from pyorrhœa alveolaris and the causation and treatment of the disease have received a good deal of attention and been the subject of much experimental investigation. The difficulty has been to distinguish amongst the crowd of micro-organisms present in the pus from the alveolar pockets those which were primarily responsible for the lesions and those which were merely secondary infections. These latter, however, may be, and probably are, of great importance in the causation of symptoms. Attention has been drawn to the almost constant presence of amœbæ in the pus, and the disease has been attributed to their action, but on the whole the balance of opinion is against the view that they are the cause of pyorrhœa. It is true that amœbæ are nearly invariably to be found, but there does not appear to be any connexion between the severity of the disease and the number of amœbæ, nor has inoculation of the purified organism in animals or in the tooth sockets of the experimenters themselves produced any characteristic lesions. With this conclusion Dr. Aubrey H. Drew and Dr. Una D. Griffin, in the April number of the *Journal of the Royal Microscopical Society*, appear to agree. Taking advantage of the large amount of material passing through their hands at the Dental Hospital, they have investigated very fully the parasitology of pyorrhœa, and have described some interesting phases in the life cycle of the amœba and discovered what they believe to be new species of flagellates. In conjunction with Dr. Penfold they attempted, though without success, to obtain a lytic serum by the injection into animals of pure cultures of amœbæ which by their technique they had succeeded in obtaining from the pus. These cultures were able to produce abscesses containing living amœbæ when inoculated subcutaneously in the guinea-pig. No complement-fixation bodies could be detected in the patient's blood serum when alcoholic and saline extracts of the amœbic cysts were used as antigens. The important observation was made that cysts which closely resembled the form described as *Entamœba minuta* are found in the fæces of pyorrhœa cases, and might give rise to error in the diagnosis of dysentery; these cysts are believed to be those of *E. gingivalis*. The investigation was not mainly concerned with the clinical aspect of the question, but it was noted that emetine was of no value in treatment. Mechanical injury was thought to play an exceedingly important part in the commencement of the disease, which almost invariably starts as a marginal gingivitis. Following the injury the spirochetes, such as *Sp. vincenti*, appear to play the chief part in the disease, causing destruction of tissue and the formation of pockets in which pyogenic cocci and other organisms find a good breeding-ground where toxin formation and absorption can go on continuously.

ANGLO-SAXON MEDICINE AND THE ORIGINS OF FRENCH SURGERY.

ON Anglo-Saxon medicine Dr. Charles Singer throws light in an erudite monograph reprinted from the Proceedings of the Royal Society of Medicine and entitled "A Review of the Medical Literature of the Dark Ages, with a New Text of about 1100." Throughout the period prior to the twelfth century, when the translations from the Arabic writers, which afterwards so largely influenced mediæval medicine, had not yet permeated Europe, the Anglo-Saxons would seem to have stood practically alone among medical authors outside the pale of Latin or Romance Europe. Some 89 vernacular medical texts in Teutonic, or, as we should prefer to say, Nordisk languages, have been reprinted by Professor Sudhoff, and of these, as Dr. Singer points out, "not more than thirteen are earlier than 1100, and of the thirteen all save three or four and all the longer texts are English." Chief among these texts is the "Leech Book of Bald," probably written in the first half of the tenth century. This contains only herbal remedies with the conditions justifying their employment. Dr. Singer says:—

"The general characteristic of this Anglo-Saxon literature is the wide knowledge of herbs which it displays, together with the extreme simplicity of its pharmaceutical processes. There are no anatomical descriptions, there is no attempt

[2] Brit. Med. Jour., Nov. 19th, 1898, p. 1550.

to separate diseases from symptoms. The pathological condition is named and the remedy follows (as in the περί διδαξέων or the Leech Books), or the herb is named and the symptom follows (as in the first part of the Herbarium of Apuleius)."

The text reprinted in Dr. Singer's pamphlet is the medical portion of the Scientific Encyclopædia of the Twelfth Century, contained in a MS. in the Library of St. John's College, Oxford. The work as a whole is perhaps the earliest known encyclopædia. It is couched in an often surprising latinity, and affords a good idea of the state of knowledge at the time of the Norman Conquest. The medical portion of the compendium deals with the constitution of the body in relation to the four humours, the regimen of the four temperaments, phlebotomy, prognostication of life and death, herbs, weights, measures, electuaries, plasters, an Anglo-Saxon charm to stop bleeding of the nose, the relation of fevers to the humours, the principles of pathology, panaceas, remedies, and the diseases to which they are applicable. In all this there is no word of surgical technique, even in the case of bleeding, or of surgical instruments, which, as Dr. Singer points out in a further learned account of the Guy de Chauliac MS., preserved at Bristol, were not figured in diagrams before the thirteenth century. Guy de Chauliac's MS. belongs probably to the period between 1420 and 1435, when John, Duke of Bedford, was Regent of France. The document was apparently written for presentation to him by Jean Tourtier, Master in Surgery. It contains eight miniatures, reproduced by Dr. Singer, representing various operations. We have here the origins of modern surgery. In one picture, for instance, an inguinal bubo is being opened, in another a fractured limb is being put into splints. Phlebotomy is practised as at a much later date, the patient holding a surgeon's staff of the kind still seen over barbers' shops, while blood pours from his right arm into a bowl. The pictures of ancient trephining instruments are of great interest, as are also others representing cauteries and gouges, but the modern instrument maker is not on familiar ground here as he would find little to suggest the evolution of his work.

ERRATUM.—In a note last week on the debt of medicine to the discovery of dyes an obvious misprint occurs, a negative having been omitted. We speak of the possibility of finding selective substances "which are inimical to the human organism"; the sentence should be "which are *not* inimical, &c." The context has probably prevented any misunderstanding.

THE LANCET, VOL. I., 1917: THE INDEX.

THE Index and Title-page to the volume of THE LANCET completed with the issue of June 30th are now ready. Owing to the continued shortage in the paper-supply, the Index will not be issued with all copies of THE LANCET, as was the custom prior to the War. Subscribers who bind up their numbers are requested to send a post-card to the Manager, THE LANCET Office, 423, Strand, London, W.C. 2, when a copy of the Index and Title-page will be supplied free of charge.

THE METROPOLITAN HOSPITALS AND THE AIR RAID.

HOSPITALS have a special and severe responsibility upon them in the event of air raids, as they have to provide for the protection of an aggregation of individuals, any or all of whom may be affected in ways that preclude opportunity being taken of ordinary precautions. For some patients the attacks add to a mental depression already upon them, while for others the physical disabilities increase the sensations of terror by the knowledge of abnormal helplessness. In these circumstances it is necessary that complete arrangements should be made in advance, not only for warding off danger as far as possible, but for keeping the unfortunate charges of the institution in good heart.

From an inquiry we have made at various of these institutions in the metropolis it is certain that the authorities have fully recognised their onus, that their staffs, medical and institutional, dealt with an anxious situation calmly and promptly, and that everywhere the note of readiness removed the worst concomitant of an air raid—namely, panic. It is noteworthy—though surprising only to those who are unfamiliar with the courage characteristic of hospital inmates in all circumstances—that the patients played their part splendidly; men, women, and children alike remained, almost without exception, calm and reliant upon the help that could be afforded them.

The following are notes made at the various hospitals:—

St. Bartholomew's Hospital.—There was no panic either among men or women. The nursing staff were able to keep those in their charge well under control, and no lasting bad effect from the severe strain was noticed even among the medical cases. The precautionary arrangements worked without a hitch.

Charing Cross Hospital.—The calmness of the patients was wonderful. Two girls cried, but no one else showed any emotion.

St. George's Hospital.—The patients remained perfectly calm and there did not appear on the surface to be any great difference of demeanour in the behaviour of the sexes. The main idea seemed to be curiosity and an endeavour to ascertain what was happening. Certainly there was no question of fear. The special arrangements made at the hospital, both for the treatment of a large number of emergency casualties and also for the speedy removal of patients, if necessary, from any part of the hospital, worked very satisfactorily.

Guy's Hospital.—A member of the staff, who was engaged with out-patients at the time of the raid, reports the demeanour of the patients to have been very good indeed. "Though naturally a little restless and anxious, in no way was there a tendency to panic. One woman commenced to cry but was soon reassured. I allowed my patients and the ordinary casualty patients to smoke; they appreciated this and there was no difficulty in controlling them. In my special department where nervous manifestations might have been expected, none occurred. One man who had his leg amputated on the occasion of the air raid on June 13th, when he suffered considerable shock, showed similar symptoms and cried like a child for four or five hours afterwards. The patients admitted immediately after the raid showed no signs of panic, and arrangements were quickly in hand for coping with large numbers of accidents, the junior staff and the nursing staff working admirably. I remember my head nurse's face, which said simply, "All this air-raiding is a nuisance." I had on this occasion no difficulty in getting the students to seek cover.

London Hospital.—The steady behaviour of the patients during Saturday's air raid, which has marked every raid since the Zeppelin days, was again manifested. There was no noticeable difference in the demeanour of the male and female patients, but the patients still with us who were admitted after the raid of a month ago were more terrified of this raid than any of the other patients. The arrangements made at this hospital for air raids are of the most minute and elaborate character, both in regard to the inmates and in regard to the reception of new patients, the various resident medical officers being assigned to different sections of the huge hospital with the special duty of quelling all panic and taking charge of the removal of patients should occasion occur.

St. Mary's Hospital.—During Saturday's air raid the behaviour of the patients in this hospital was excellent. The women and children, as well as the men, were calm and self-possessed, and ready and willing to submit themselves to the arrangements made by the hospital for their safety. These arrangements were all in working order.

Middlesex Hospital.—All the patients, male and female, behaved admirably during the air raid on Saturday last. That they maintained their self-control so well was largely due to the example set them by the sisters and nurses, who proceeded with their work in the ordinary way, thus inspiring the patients with confidence. This has been the case in all previous raids both by day and night. All the arrangements worked satisfactorily.

St. Thomas's Hospital.—Throughout the raid the patients behaved extremely well, though there were one or two cases of mild excitement; some of the bed-ridden soldiers were nervous, but the majority of the patients who were able to do so stood ready to give aid if occasion arose. There were some isolated cases of out-patients being nervous, but the vast majority were only anxious to see something of what was going on. The sisters and nurses of the hospital are now so used to alarms being given that they regard the whole proceeding very calmly and are thereby able to reassure their patients. The most excitement was

shown by some out-patients in the casualty department and other persons from outside who came into the hospital for shelter. These were all sent down into the basement where they remained quiet until all danger was passed. The hospital and the medical and surgical officers in attendance were prepared to meet any emergency, and there is a good supply of extra beds which would at once be sent to the wards for the accommodation of any cases brought in as a result of the raid.

University College Hospital.—The patients remained calm, the female as well as the male, and the hospital arrangements in case of emergency worked satisfactorily.

Westminster Hospital.—The patients remained perfectly calm and it was not observed that either sex was specially affected. "Nervous" cases of both sexes were somewhat upset, and some "heart" cases showed increased symptoms—rapidity of pulse, and so on. All other patients, medical and surgical, preserved their coolness excellently. The medical and nursing staffs went at once to assigned posts, their discipline being the main cause of the calm manner in which the situation was met by the patients.

The Hospital for Sick Children, Great Ormond-street.—During the raid there was no trouble whatever with the children in the wards nor with the nursing staff. The out-patient department was full at the time, and at the first sound of guns from the anti-aircraft section all the mothers and children were sent to the basement. Very few of the mothers were upset, and they were foreigners.

London Fever Hospital.—The behaviour of the patients was excellent. No cowardice was manifest. The boys with scarlet fever, with the exception of one boy who cried, took to active vocal verbalisms derogatory to the "fat-heads," "square-heads," and "pigs of Germans." Such of the female patients as could rise went to look at the fleet passing over the hospital, but one took refuge under her bed and another in a coat-cupboard. No other nervous manifestations were noticed among the patients. The medical superintendent of the hospital sends us this significant note: "I think that an anticipation of disaster was felt by most, but that they were all too proud to betray their fears by emotional manifestations."

Some of the hospitals were of course more tried than others, although for obvious reasons we refrain from indicating which. Our purpose is to show that a particularly vulnerable section of the population preserved their calm in a time of great trial, and that a well-thought-out organisation played the part assigned to it.

THE CONTROL OF VENEREAL DISEASES.

Enlightenment Campaign.

A cinema film entitled "Es werde Licht!" (Let there be light!) is being exhibited in the German cities, showing in dramatic form the misfortune which an individual suffering from syphilis can bring to his family as a result of his carelessness or his ignorance of the danger. The film is issued with the support of the German Society for Combating Venereal Diseases, and is compared by the *Münch. med. Wochenschr.* to the drama "Die Schiffbrüchigen," the German for "Les Avariés," of which an English version, entitled "Damaged Goods," continues to attract large audiences at the St. Martin's Theatre, London. The German film is said to be very impressive in spite of its undue length, the physician taking leave with the words "I have done my duty," after seeking without success to dissuade his syphilitic brother from contracting a marriage, and leaving the audience to draw the conclusion that in leaving his brother's unsuspecting fiancée to her fate the physician has by no means done his duty as judged by modern standards. The same conflict between professional and social motives comes out also in "Damaged Goods," in which, however, Brieux has drawn the rôle of the doctor on lines which command throughout the assent of the audience. The play might have indeed been written for an English audience of advanced thought except for the unfortunate statement made by the doctor, and not challenged, that not more than four out of every thousand young men have failed to run the risk of contracting syphilis. It is impossible to exaggerate the educational value of such plays and films as these, and Brieux may be regarded at the present time as a main agent in bringing the evils of unchastity before the youthful population of London.

The Early Preventive Treatment of Venereal Diseases.

We have been reproached during the last few months with, on the one hand, rendering accessible to those who wish to make use of them the means of indulging in promiscuous sexual intercourse without risk of contracting venereal disease; and, on the other, with refusing to regard the prevention of venereal disease as a matter purely of physical hygiene without reference to social and moral considerations. We therefore take the opportunity of printing the following letter which we have received from an Indian correspondent. Without containing anything new, this letter takes the *via media* which a medical man can adopt with a clear conscience towards his scientific knowledge and his social relations.

I have read with keen interest the correspondence in your journal on the prophylaxis of venereal diseases. The key to the situation lies in the realisation of the fact that while prophylaxis is good in its own way, it is capable of doing harm by removing the fear of consequences that has exercised a healthy check on illicit intercourse in some cases, though not in all cases. That consideration would adequately weigh against the rule of giving prophylactic advice if it were practicable to keep the advice away from those who seek it. But it is not so. Some may agree not to give such advice, others will disagree. And if the profession were to agree to observe the taboo, the quack would step in to supply the demand from the public. Since the advice is sure to be forthcoming, it would be better to let it come from the profession that knows its business than from the quack, and from the more scrupulous section of the profession than from the less scrupulous one. An attempted taboo would prove disastrous by driving the advice-seekers to less scrupulous and less competent advice-givers.

If we cannot withhold the advice, we should minimise the harm it is capable of doing by warning the patient that no prophylaxis besides abstinence is absolutely reliable or altogether safe, and informing him that illicit intercourse is injurious in a variety of ways, and that venereal diseases are not the only bitter fruits it bears. In that connexion a suitable moral lesson can be given which may have some salubrious effect in some cases if not in all cases.

In short, where advice is sought for, it should be given alongside with suitable moral advice. But it should not be carried home to those who seek it not. The great majority of such people would not care to follow the advice. On the other hand, immense harm would be done to the nation at large by openly countenancing and indirectly justifying indulgence, and thereby removing the sense of impropriety that has hitherto served as an effective healthy check in many cases, though not in all cases.

People who delight in considering themselves practical and scientific are prone to belittle and ignore the invisible moral and spiritual forces that rule the conduct of man and the destiny of nations, and to think too much of the visible means that achieve tangible results. But it is the invisible that counts in the long run, and material achievements eventually come to naught where they are not along the line of moral requirements. We should therefore take care not to preach and popularise prophylaxis at the risk of spoiling the moral sentiment and lowering the moral tone of the nation at large.

Princess-street, Bombay, April 28th, 1917. J. K. DAJI, L.M. & S.

NATIONAL BABY WEEK.

THE week in London closed under circumstances which amply justified the National Baby Week Council in having decided to give up street processions. On this day Queen Alexandra distributed at the Central Hall, Westminster, the prizes and certificates which had been awarded in the various competitions. As a result of Baby Week Adeline, Duchess of Bedford, announced at a meeting of mothers the establishment of a hostel for blind infants where treatment would be given and education arranged for them as they grew up. Dr. R. M. Wilson, who spoke at a conference on mothers' rights, emphasised the need for adequate medical attendance for mothers, as to which, he said, all idea of charity should be eliminated, the health of women and children being the proper care of the State. The new day nursery, which was opened by Lady Rhondda, at Edridge House, Fulham Park-road, with special grants from the Ministry of Munitions and the Board of Education, will accommodate 50 children and is regarded as a model of its kind. Mr. J. C. Jackson, the medical officer of health for Fulham, is chairman of the general committee. At a conference where the question of the supply of midwives was discussed, Dr. E. W. Hope, the medical officer for Liverpool, advocated the fixing of a standard of skill for the midwife, to whom some attraction should be held out in order to ensure the well-educated woman such remuneration as to free her from financial anxiety. He was not in favour of making the midwife a municipal officer. Through the midwives alone could the benefit of antenatal care be fully realised. Fewer doctors would be available for midwifery after the war.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—The annual meeting of the Fellows of the College was held on July 5th, the President, Sir W. Watson Cheyne, being in the chair. The result of the election to the Council was as follows:—

	Votes.	Plumpers.		Votes.	Plumpers.
Vincent Warren Low	296	34	Henry Betham Robinson	188	15
James Sherren	228	32	Harold Barr Grimsdale	147	28
William Harrison Cripps	220	10	Percy William Bassett-Smith	137	15
Francis James Steward	197	53			

Colonel Charters Symonds, the Vice-President, declared that Mr. Warren Low and Mr. Cripps were re-elected members, and that Mr. Sherren was elected a member of the Council of the College. Seven Fellows voted in person, and 628 votes were received by post. Two voting papers were invalid and three arrived too late. Mr. H. J. Price and Mr. Willmott Evans acted as scrutineers.

Correspondence.

"Audi alteram partem."

THE LUMLEIAN LECTURES AND MEDICAL RESEARCH:

THE ASSESSMENT OF THE VALUE OF MURMURS.

To the Editor of THE LANCET.

SIR,—The principles which should underlie every clinical investigation are (1) to find out the mechanism by which each sign is produced, and (2) the effects which the cause of the sign has on the individual's future life. No doubt Sir Douglas Powell would say these principles are but truisms, but they are truisms of that kind which everyone reckons to recognise, but which no one puts in practice. The state of our knowledge of nearly every clinical sign reveals how systematically these principles have been ignored, and the attitude of the profession towards murmurs shows the need for applying them in practice. My reason for wishing Dr. Alexander Morison—or, for that matter, any other writer—to state precisely how a murmur should be assessed was to show that this could not be done. In this way I wished to emphasise the fact that a symptom so common, one which every doctor fancies is well understood, has never received that careful investigation which would enable us to appreciate its clinical significance and its practical application.

I could illustrate in numerous ways the need for a more thorough understanding of the significance of murmurs, but I will limit myself to one instance. Every doctor who engages in general practice will have from time to time put to him the question—whether a woman who has, or is supposed to have, some heart affection should be allowed to become pregnant. This is a momentous question, and every year concerns thousands of women. Now there is not in all medicine sufficient knowledge to enable the practitioner to answer that question in a satisfactory manner, and though it is constantly arising the practitoner can do nothing but give an opinion based mainly on guesswork and not on accurate knowledge. Why is this? Simply because he is taught by men who are ignorant of the subject. His obstetric teacher's knowledge of heart disease is too imperfect for him to be able to tell. His teacher of medicine never attends obstetric cases, so he can't know the effects of pregnancy on the heart. Why should not these teachers manfully acknowledge their ignorance? They have not had the opportunity to acquire the knowledge—why not frankly state this fact, and ask those who have the opportunity to undertake the inquiry?

The reason I speak thus dogmatically on the subject of heart disease and pregnancy is that this problem has been before me for many years. Shortly after entering general practice I attended a woman in labour with mitral stenosis, who died after great suffering, undelivered. I was so impressed by my helplessness that I read all the literature I could find on the subject. I was struck by the fact that no one seemed clear as to the source of danger, and no one had really studied the effects of pregnancy on the circulation of the healthy woman. I resolved to do this, and for years I made observations on women before pregnancy, during pregnancy and labour, and during the puerperium and afterwards. I accumulated a large number of observations, and when I came to analyse them I found myself unable to interpret them. I found variations in the size, the shape, and the position of the heart; modifications of the heart sounds and the appearance of murmurs; variations in the rate of the heart and frequent irregularities, and great distension of the jugular veins with marked pulsation. I searched the literature for enlightenment and failed to find it. I was therefore driven to a preliminary investigation—namely, to seek to know the mechanism by which these signs were produced and the effect the cause of these signs had upon the patient's future. This is what I have been doing the last 30 years. I have not solved the problem; I have only been able to indicate the lines on which this problem may be solved and to help to furnish some information in regard to the nature of the symptoms that may be of use to future investigators.

In my inquiry into the significance of these signs I was led to the conclusion that little advance could be made by the mere study of the murmurs, for I found that when heart failure ensued it was by impairment of the efficiency and by changes in the structure of the heart muscle. This led to a prolonged and systematic inquiry into the functions of the heart muscle and the signs of its inefficiency. Though for over 100 years it has been taught that the integrity of the heart's efficiency depended on the heart muscle, little or nothing had been done to study with precision and detail the signs by which this inefficiency was made manifest. The results obtained have in many ways shed a new light on the meaning of abnormal signs and on heart failure. Thus the relation of the condition of the heart muscle to any given murmur may be expressed in this way: (1) the presence of the murmur may indicate a valve defect which embarrasses a healthy muscle in its work, and we therefore have to look for the signs of embarrassment; (2) the presence of a murmur may indicate that the disease which damaged the valve may have also damaged the heart muscle and impaired its efficiency, so that we have not only to search for the signs of inefficiency, but also for signs of a damaged heart muscle.

I have failed to understand the mechanism by which the vast majority of systolic murmurs are produced. To call them curable mitral regurgitations, bruits of debility, exocardial and so forth, was simply to give them a name which conveyed a false impression, as I could get no evidence from studying them during life and examining the hearts after death to justify such terms. Failing in this, I turned to the question of the assessment in regard to the patient's future. By watching large numbers who led strenuous lives for many years I realised that the majority of systolic murmurs were without importance, and in searching for a method for differentiating those without significance from those that were of significance I inquired into the state of the heart muscle and came to the following conclusions.

If a systolic murmur was present and the response to effort was good, and there was no sign of any myocardial involvement, then the murmur was of no significance. If there was associated with the murmur evidence of functional inefficiency or of myocardial involvement, then the prognosis would depend on the extent and degree of the inefficiency and of the myocardial involvement, and this would be the object of further inquiry.

To illustrate the defects in our knowledge of the significance of murmurs, and to show how I have attempted the solution of the problem, I will comment on the letters of Sir Douglas Powell and Dr. E. H. Colbeck, as specific illustrations will carry more conviction than abstract propositions, however simple and convincing they may be.

Sir Douglas Powell gives an illustrative case which he quotes approvingly as giving all the details necessary for assessing the value of a diastolic aortic murmur. I quite agree with him it is a good example of the way in which the old school would view the matter, but in contrast to this I would show how partial and uninformative it is when it is desired to assess the value of the murmur. From the context I gather this case was one for life assurance. Now what would be the attitude of a medical examiner to such a case? Some would at once reject the man as a candidate, others might deduct a number of years from his prospect of life. On what grounds? Simply because experience tells that many people with aortic regurgitation die prematurely. Experience also tells that others with aortic regurgitation may live the normal span. As we do not know how to differentiate these, different examiners adopt different standards—but in no case is there such precise knowledge as to enable the examiner to assess the value of the murmur with any degree of accuracy.

Sir Douglas Powell's description leaves out certain data which are essential to the assessment. The first stage in heart failure is invariably shown by a limitation of the field of the heart's response to effort. This is made manifest to the patient by a sense of distress which is brought on by effort. There are a great number of sensations thus produced, each of them provoked by a different mechanism, and each of them differing in their significance, such as breathlessness, sense of exhaustion, tightness across the chest, pain, abnormal action of the heart. In estimating the efficiency of the heart muscle, not only the actual limitation of the field of response has to be recognised, but the sensations provoked by exhaustion, even if the field be not limited to any marked extent.

Now I know that everybody reckons to recognise that heart failure is manifested by a limited response to effort, yet the old school has never recognised its real significance. I maintain strongly as an experience forced upon me for the past 30 years that the recognition of the heart's efficiency is of the very first importance, of far greater importance than the recognition of any signs revealed by instrumental examination. The reason I say that the old school have never realised its importance is shown in two ways: Firstly, the questions asked by insurance companies never include the response to effort among their inquiries. Witness Sir Douglas Powell's description of his case—the response to effort is never referred to. Secondly, the profession has only an imperfect knowledge of the mechanism by which the sensations of distress in response to effort are brought about, and their relation to the heart's efficiency has never been fully appreciated.

I have already dwelt on the importance of changes in the heart muscle in estimating the value of a murmurs yet save for an incidental reference to an increased size Sir Douglas Powell makes no reference to possible change, in the heart muscle. It is now a well-established fact that a disease like rheumatic fever frequently invades the heart muscle. Hitherto such invasion has been spoken of as silent—that is to say, it was supposed to give no sign of its presence. This, however, is not true, for the evidence is there, only we are too blind to see it. The changes in the size of the heart, in the rate of the heart, and in the rhythm of the heart afford evidence, but we are not yet sufficiently informed to value these changes. Take only one instance which shows definitely the invasion of the heart muscle. During rheumatic fever deposits of cells occur in the myocardium at different places which ultimately change into cicatrical lesions, damaging the heart muscle. If a deposit of these cells takes place on the bundle connecting the auricle with the ventricle, then the transmission of the stimulus from auricle to ventricle is interfered with, and we can now recognise the sign which this produces. Before the war my fellow-workers in the cardiac department of the London Hospital were making a study of all the phenomena in acute affections of the heart, and especially in rheumatic fever. They found in acute rheumatic cases a considerable number (about 10 per cent., if I remember rightly) in which they got evidence of a damaged bundle. Now it is a matter of chance whether the bundle is touched, so that the possibilities are that there are a great many cases where the deposits occur which do not fall on the bundle.

In reading Sir Douglas Powell's case I called to mind a similar case, a young man whom I attended for a mild attack of rheumatic fever and in whom I thought the heart had escaped. Some months after, when he seemed fit and well and was working hard, I detected a diastolic murmur. There was no enlargement of the heart. On taking a tracing of his jugular pulse I found evidence of an increased interval between the auricular and ventricular contractions, proof that the disease had invaded and damaged the muscle.

Perhaps this aspect of the matter will be better appreciated if I deal with Dr. Colbeck's statement that our knowledge of mitral stenosis has not advanced from the place where Sir W. Broadbent had left it. In my remarks I desire to convey no reflection on the past masters in clinical medicine. Broadbent was a great physician with a remarkably open mind, and I revere his memory from a personal point of view, for he was one of the very few physicians who appreciated what I was driving at, and for the kindly encouragement he gave me.

In the year 1880 I saw two young men, both had had an attack of rheumatic fever, and both had slightly enlarged hearts, and both had mitral systolic murmurs. Both were mechanics, and both were refused entrance into their trades union sick club because of their damaged hearts, though both had followed their laborious occupations without distress. I watched their cases for over 25 years. One pursued the even tenor of his way with no alteration in his cardiac condition. The other had a more chequered career. Seven or eight years later I discovered he had a short presystolic murmur. About 1890 I became aware that the murmur was separated by a slight interval from the first sound. In later years the separation became very distinct, the interval being so marked that it conformed to the usual description of a mid-diastolic murmur. About this time I was trying to unravel the meaning of the jugular pulse, and as he had a well-marked venous pulse I had no difficulty in setting a good record. There was something peculiar about the waves which I did not understand at the time, but later knowledge enabled me to recognise that there was an increased a.-c. interval—as I called the time between the waves in the jugular due to the contraction of the auricle and the carotid pulse. This I ultimately learned indicated an injury to the bundle connecting the auricle and the ventricle. The time of the mid-diastolic murmur corresponded to the time of the auricular wave in the jugular pulse, so that in this case it was demonstrated for the first time that this mid-diastolic murmur not only told us of the presence of mitral stenosis, but gave the information that the muscle wall of the ventricle was also invaded by the rheumatic disease, which had damaged the a.-v. bundle.

Somewhere about 1895 I detected a new murmur immediately following the second sound, so that he then showed a systolic, an early diastolic, and a mid-diastolic murmur. His heart's rate was always about 60, so that we had no difficulty in recognising these different murmurs. He continued his work till 1897, when he became seriously ill from extreme heart failure with dropsy. After a long period he made a slow recovery. During his illness his heart became very irregular, an irregularity which at the time I did not understand. I took careful records of his radial and jugular pulses, and in later years I recognised that the irregularity was due to the dropping out of ventricular beats—i.e., an increase in the heart block. The failure was evidently a myocardial one, for on his recovery the heart became quite regular and the murmurs present were unchanged. He resumed his work, and I detected no further change till March, 1904, when on one of his monthly calls on me I found his heart quite irregular with a disorderly rhythm. Up to this time records of his apex beat and of the jugular pulse had always shown "a" waves—that is, waves due to the left auricle in the apex-beat and to the right auricle in the jugular pulse. On this visit these had disappeared. The mid-diastolic murmur had also disappeared. A week later the heart was again quite regular, the "a" waves had returned to the jugular pulse and to the apex-beat tracings, and the mid-diastolic murmur had returned. This regular rhythm continued until November of that year, when the heart became again irregular, with the disappearance of all evidence of auricular activity—the condition of irregularity now known as auricular fibrillation, but which at that time I called paralysis of the auricle.

There were many other features revealed by this method of observation in this case, to which I need not here refer, as my purpose is to demonstrate certain facts connected with mitral stenosis which have never been clearly appreciated. Thus it is shown that the presystolic murmur appears some time after the causative attack of rheumatic fever; that as the stenosis is progressive its progress is made manifest by the changes in the murmur—first a short presystolic, then a longer presystolic, then a short diastolic which also increases in length. In observing a great many cases I find that these changes vary greatly in the time of their appearance after the causative illness—some, indeed, get a long presystolic and a long diastolic murmur within a few years. Here, then, we have a measure by which we can gauge the rate at which the stenosis takes place—a factor of the very greatest importance in giving a prognosis, especially in relation to heart disease and pregnancy.

In a great many people with mitral stenosis the real danger lies in the coincident changes in the heart muscle. I have notes of the case of a young man with moderate stenosis, but with a slight degree of heart-block, who died from muscle failure of the heart. On post-mortem examination extensive disease was found in the heart muscle. In another, a woman who suffered for years from a heart with a limited response, the mitral stenosis was very slight, but her death was finally precipitated by the onset of auricular fibrillation, and in her the left ventricle was extensively fibrosed.

In addition to these very important changes, it was in mitral stenosis cases that I got the clinical evidence that showed that curious cessation of auricular activity which we now call auricular fibrillation. I had long suspected this, and I set myself to watch individual cases of mitral stenosis, and in a woman whom I attended for 17 years, and who had in 1897 a serious attack of heart failure with marked irregular action, I was able to find all the evidences as in the case just described. Moreover, it was in these cases of mitral stenosis that I was able to recognise the extraordinary difference in the reaction of the heart to drugs of the digitalis group before and after the onset of the irregular action, and that peculiar susceptibility to the action of digitalis in auricular fibrillation which has revolutionised our conception as to the action of the drug.

I think if the reader duly comprehends the significance of these signs he is bound to admit that there has been a great advance in our knowledge in late years. I know that many physicians will probably "pooh-pooh" all these discoveries and tell us they get all the necessary facts from the old teachers, but the intelligent reader will have little difficulty in estimating the value of these protestations.

It will thus be seen that the assessment of a murmur cannot be of any value unless the efficiency of the muscle is taken into consideration. To appreciate the efficiency and the degree of efficiency it is necessary to detect the signs by which an inefficient and impaired muscle is made manifest. It is only in recent years that this matter has been studied, as it is only in recent years the methods by which it could be done have been developed.

Moreover, the manner by which heart failure is brought about and the action of cardiac remedies cannot be understood until we possess a fuller knowledge of the myocardial functions, and it is because we lack this knowledge that I made the statement that an accurate account of the action of digitalis on the human heart has never been published.

My reason for taking part in this correspondence is to show that if clinical medicine is to progress we must not rest content with the complacent notion that the limits of progress have been reached. We must recognise how imperfect is our knowledge of every clinical sign or symptom. Just as we do not know yet how to assess the value of many murmurs, so we are ignorant of the significance of many clinical signs.

Until this is recognised by the profession and a strenuous attempt made to understand the causation and significance of such signs, progress in clinical medicine will be greatly hampered. I am, Sir, yours faithfully,

Harley-street, W., June 29th, 1917. JAMES MACKENZIE.

THE DETECTION OF *ENTAMŒBA HISTOLYTICA* AND ITS CYSTS.

To the Editor of THE LANCET.

SIR,—In your issue of June 30th you publish an article, in the form of a report to the Medical Research Committee, on "The Detection of *Entamœba histolytica* and its Cysts," which calls for a little comment. The author does not refer to the paper published in your journal on April 14th by Dr. R. Donaldson, in which I had the honour of participating, but obviously there is much in common between the methods of both authors. Where, however, the latter author extends beyond the matters dealt with by Dr. Donaldson, he shows some lack of due judgment. Thus he gives instructions for the benefit of bacteriologists who may be tyros at the protozoal examination of fæces. Now perfectly inexperienced workers with the microscope may find these suggestions helpful, though less adequate than most text-books, but such persons must, as he points out, take their instruction at first hand, failing which they should not be in a position to make diagnoses at all. If, on the other hand, the remarks are addressed to those of riper experience in laboratory technique who have to turn their attention to this work, then I deplore the pessimism of the author, who considers that they need to be told to use good lenses and a mechanical stage!

Moreover, I demur at his advice on magnification. I find a ⅓" (8 mm.) objective far the best for routine examination. Used with a × 10 eyepiece this gives more than six times the area of field and 76 per cent. of the magnification of a ⅛" and × 6 eyepiece as recommended. The use of an orthoscopic eyepiece in place of the usual Huyghenian type greatly increases the field of view in either case. Everyone has his own preferences in these technical matters, and, like most microscopists, I would altogether mistrust the too detailed advice of others of whose *modus operandi* I knew little or nothing. Still, I am glad to notice that he does not mention that bad old idea of lowering the substage condenser to render details more easily visible. Although widely prevalent, it is quite inconsistent with optical theory or sound practice.

The portion of the paper dealing with staining the preparation treats, but without further profit, ground already covered in detail by Dr. Donaldson. Indeed, by the use of carbol fuchsin one great advantage of the earlier method is lost—namely, the diffused colour of the background, for the débris absorbs all the stain, leaving the field practically decolourised. If a saline emulsion be simply tinged with a little strong eosin, as good a differentiation of cysts (white on a red field) is obtained as with this carbol fuchsin and blue light. Neither method rids one of the confusion of other uncoloured objects, such as triple phosphate crystals; neither method aids the differentiation of the two types of cyst, and when doubt arises recourse must be had to iodine. In the previously quoted paper a certain mixture of iodine and eosin or rubin is advocated as the regular routine preparation for emulsification of fæces. Iodine *must* be used in doubtful cases, but two objections have been urged against its use in the first instance: firstly, that it agglutinates the fæces and so obscures the cysts. This is, I am sure, largely imaginary, since observation shows that not one specimen in 20 agglutinated with the strong iodine-rubin mixture, and, moreover, this solution will show up cysts even in unemulsified portions of fæces mounted in it.

The second argument is that it kills, and therefore obscures, free-living amœbæ and flagellates. In both cases, nevertheless, the sharply defined outline of the fixed organism at once attracts notice, and the absorption of stain actually enhances its visibility in many cases. Where acute symptoms are present final reference will always be to a saline preparation for the detection of living amœbæ; but I wish to emphasise that the primary use of a stained preparation does not exclude them. For military purposes the diagnosis of flagellates is of lesser importance, since almost all physicians agree in ignoring them.—I am, Sir, yours faithfully,

R. C. MCLEAN.

Pathological Laboratory, No. 1 War Hospital, Reading, July 4th.

ON SKIN-GRAFTING.

To the Editor of THE LANCET.

SIR,—The authors of the paper on the above subject in your issue of July 7th have apparently overlooked an article which appeared in THE LANCET of Nov. 25th, 1899, in which I described a method of skin-grafting in many respects resembling that which they describe and which aims at covering a raw surface with something firmer and less likely to contract than the ordinary Thiersch grafts.

I am, Sir, yours faithfully,

Upper Wimpole-street, W., July 7th. THOS. H. KELLOCK.

WAR HEART.

To the Editor of THE LANCET.

SIR,—The variety of war heart described by Colonel A. E. Garrod in your issue of June 30th is of great interest. Its occurrence in cases of malaria, dysentery, and trench fever, and the nature of the physical sign described, prompt me to refer to a similar condition found in another epidemic disease—viz., diphtheria. Colonel Garrod states that "the physical sign is an extension of the cardiac dullness towards the right, often to 1½ or 2 inches beyond the mid-sternal line. Only in extreme cases is there any conspicuous extension toward the left." This sign is also of frequent occurrence during the course of diphtheria, and in my experience is never absent in cases showing definite evidence of post-diphtheritic paralysis. The increase beyond the right margin of the sternum very often precedes the onset, and always accompanies the appearance of the well-known forms of diphtheritic palsy. If the latter be severe and extensive the dullness to the left is also increased and is of serious omen. In a paper read before our local medical society in 1908 I ventured to describe these right and left extensions as the "distant" and "near" danger signals respectively of the heart condition. These measurements of the deep cardiac dullness are of great prognostic value, and, as in the cases described by Colonel Garrod, give definite guidance, not only as to the need of rest, but also as to how long it should be continued. Why the right side of the heart dilates earlier than the left in these toxic states is an interesting question, and one to which I do not remember having seen a sufficient answer.

As one who had the privilege of working under the late Dr. D. B. Lees, I am glad to see the reference to his teaching and methods. He emphasised the importance of light finger percussion, of frequent (daily) mapping-out and measurement, and the careful keeping and comparison of records in the study of dilatation of the heart chambers in conditions of disease.—I am, Sir, yours faithfully,

Cardiff, July 2nd, 1917. ALFRED HOWELL, M.D. Lond.

The War.

THE CASUALTY LIST.

THE following names of medical officers appear among the casualties announced since our last issue :—

Killed.

Capt. J. E. Brydon, R.A.M.C., attached Yorkshire Regiment, qualified at Edinburgh in 1908, and had held appointments at the Bristol Children's Hospital and at the Darlington Hospital. Before joining the R.A.M.C. in the early part of 1915 he was in practice at Chagford, Devon.

Major W. G. Porter, M.B., B.Sc., F.R.C.S. Edin., D.S.O., who was acting as a combatant officer, qualified at Edinburgh in 1906, in which city he was a well-known ear, nose, and throat surgeon, and held several hospital appointments. When war broke out he held captain's rank in the Royal Field Artillery Territorial Force, and in the autumn of 1915 he went on active service in France. The award of the D.S.O. was gazetted early in June this year.

Accidentally Drowned.

Lieut. F. Whincup, R.A.M.C., was a student at St. Bartholomew's Hospital, London, and qualified in 1897. He had held appointments at the Shropshire and Mid Wales Eye, Ear, and Throat Hospital, at the Stroud Hospital, and at the Devon and East Cornwall Hospital, Plymouth. Prior to joining the R.A.M.C. he was in practice at Shrewsbury where he was physician to the Royal Salop Infirmary, and medical officer to the Post Office and Board of Education. He was accidentally drowned in France.

Died.

Capt. A. L. M. Churchill, R.A.M.C., attached London Regiment, was a student at Westminster Hospital, and qualified in 1895. After holding appointments at Wonford Hospital and at the County Asylum, Lancaster, he practised at Mevagissey, Cornwall, and joined the R.A.M.C. towards the close of the year 1914.

Lieut. A. Atkinson, R.A.M.C., was educated at Leeds, and qualified in 1884. He held the appointment of house surgeon at Leeds General Infirmary, and was in practice at Harringay, London, before joining the R.A.M.C.

Wounded.

Capt. L. R. Meech, M.C., R.A.M.C.
Capt. R. L. Kenihan, Australian A.M.C.
Major H. D'A. Beumberg, R.A.M.C., attd. Liverpool Regt.
Capt. R. Johnson, R.A.M.C.
Capt. F. A. Hampton, R.A.M.C., attached Royal Scots.
Capt. H. Young, R.A.M.C.
Lieut. J. Berry, New Zealand M.C.
Capt. E. A. Walker, R.A.M.C.
Major L. W. Bond, Australian A.M.C.

CASUALTIES AMONG THE SONS OF MEDICAL MEN.

The following additional casualties among the sons of medical men are reported :—

Second Lieut. C. W. Goodall, South Staffordshire Regiment, killed in action, second son of Dr. E. W. Goodall, of the North-Western Hospital, Hampstead, London.

Second Lieut. C. C. Lucas, Northants Regiment, killed in action, youngest son of the late Dr. R. C. Lucas, of West Lavant, near Midhurst, Sussex, and of Wimpole-street, London.

Capt. B. R. Poole, Canadian Army Veterinary Corps, killed by a shell whilst on duty with the Railway Corps, youngest son of Surgeon-Major Poole, Bengal Medical Service.

Second Lieut. J. E. Power-Clutterbuck, Royal Field Artillery, attached Royal Flying Corps, killed in action, only son of the late Surgeon-Major E. R. Power, A.M.S.

Second Lieut. J. MacH. Crombie, Royal West Kent Regiment, died of wounds received in action, youngest son of Dr. J. Crombie, of Sidcup, Kent.

MENTIONED IN DESPATCHES.

In a despatch received from General Sir Archibald Murray describing the operations undertaken by the Egyptian Expeditionary Force from October, 1916, to February, 1917, the names of the following medical officers are mentioned for gallant or distinguished conduct in the field or for other valuable services :—

Staff.—Maj. H. V. Bagshawe, R.A.M.C. ; Maj. R. H. Bridges, R.A.M.C. ; Capt. G. Dalziel, R.A.M.C., Spec. Res. ; Lt.-Col. E. J. R. Evatt, R.A.M.C. ; Capt. A. S. M. Macgregor, R.A.M.C.(T.F.) ; Col. C. J. MacDonald, A.M.S. ; Col. (temp. Surg.-Gen.) J. Maher, A.M.S. ; Lt.-Col. (temp. Col.) O. L. Robinson, R.A.M.C. ; Col. M. J. Sexton, A.M.S. ; Maj. G. C. Taylor, R.A.M.C.

R.A.M.C.—Capt. (temp. Maj.) J. Aitken ; Capt. J. A. H. Aitken ; Capt. C. H. Allen ; Temp. Capt. P. H. Bahr ; Capt. L. B. Baird ; Capt. F. S. Bedale ; Temp. Lt. F. J. H. Begg ; Capt. M. Brennan ; Capt. A. E. Bullock ; Capt. (temp. Maj.) O. C. P. Cooke ; Temp. Lt. F. W. Davidson ; Capt. J. Davidson ; Capt. H. R. Dive ; Maj. (temp. Lt.-Col.) M. Dunning ; Maj. (temp. Lt.-Col.) J. Evans ; Temp. Maj. A. R. Ferguson ; Capt. W. T. Gardiner ; Capt. (temp. Maj.) W. W. Greer ; Capt. A. A. Gunn ; Temp. Lt. A. E. Harrisson ; Maj. (temp. Lt.-Col.) R. B. Hole ; Lt.-Col. A. Hosie (ret.) ; Capt. J. Inglis ; Maj. C. Kerr ; Temp. Capt. H. V. Leigh ; Temp. Capt. F. J. McGlade ; Temp. Capt. R. B. F. McKail ; Capt. W. F. Mackenzie ; Capt. A. A. McWhan ; Lt.-Col. W. R. Matthews ; Capt. W. H. Milligan ; Maj. (temp. Lt.-Col.) H. T. Samuel ; Lt.-Col. G. Scott (ret.) ; Capt. C. F. Searle ; Capt. A. F. B. Shaw ; Temp. Capt. H. P. Sheppard ; Temp. Capt. H. E. S. Stiven ; Capt. O. Teichmann ; Lt.-Col. H. W. Thomson ; Capt. W. T. Torrance ; Capt. W. W. Treves ; Maj. (temp. Lt.-Col.) G. A. Troup ; Capt. P. S. Vickerman ; Capt. R. G. Walker ; Capt. A. P. Watson ; Capt. T. Young

Australian A.M.C.—Capt. W. Evans ; Lt.-Col. W. A. Fraser ; Lt.-Col. R. Macdonald.

New Zealand M.C.—Capt. (temp. Maj.) C. E. Hercus ; Lt.-Col. C. T. H. Newton ; Capt. R. L. Withers.

I.M.S.—Maj. R. W. Knox ; Maj. T. C. Rutherfoord ; Capt. R. B. S. Sewell ; Lt.-Col. A. J. Willcocks.

Order of St. John of Jerusalem.—Dr. A. Granville, C.M.G.

Civil Departments, &c.—Dr. J. Warnock.

THE CANADIAN HOSPITAL, ORPINGTON.—On July 5th Mr. Walter Long, Secretary of State for the Colonies, opened an extension of the Ontario Military Hospital at Orpington. Like the original institution, the extension is the gift of the province from which the hospital takes its name, but it is open to wounded men of all branches of the Army of the Empire. When started in February, 1916, the hospital had an accommodation for 1040 beds, but this has now been doubled. A statement by Lieutenant-Colonel Macpherson, the Commandant, showed that during the past 12 months 8129 men had been treated, of whom more than half were inhabitants of the British Isles, 2943 of Canada, and 576 of Australia.

THE DEPLETION OF HOSPITAL STAFFS.—Mr. Cosmo Bonsor, the president of Guy's Hospital, has on behalf of the governors of the hospital drawn the attention of Lord Rhondda, then President of the Local Government Board, to the difficulties in which hospitals with medical schools were likely to be placed unless steps were taken to prevent the further depletion of their staffs ; he pointed out that the closure of important departments was imminent and would be very serious in consequence. Lord Rhondda replied, hoping that the provisions of the Military Service Act, 1916, would prevent any undue hardship to hospitals, and considered that the Committee of Reference of the English Royal Colleges, acting in conjunction with the Central Medical War Committee, would be able to meet the needs of the Army without unduly restricting hospital service. No member of a hospital staff is taken until his case has been considered by the Committee of Reference.

KING GEORGE'S FUND FOR SAILORS.—This Fund, which has for its president Prince Albert and for its chairman the Duke of Connaught, has been established on the same lines as King Edward's Hospital Fund for London, in the interests of seamen of the Royal Navy and mercantile marine and their families. All institutions, including hospitals, which are supported wholly or in part by public contributions for the benefit of seamen will receive aid from the Fund. From July 22nd to 28th, "Navy Week," the leaders of the stage and the cinema industry have arranged a special programme in aid of the Fund, the offices of which are at Trinity House, Tower Hill, E.C.

OBITUARY OF THE WAR.

LEWIS EMERSON CLARK, M.D. MCGILL,

CAPTAIN, CANADIAN ARMY MEDICAL CORPS.

Lewis Emerson Clark, who was killed in action on the Western front on the morning of June 7th, at the age of 29 years, was son of Mrs. C. F. Clark, of Vancouver, and was born at Ellsworth, Kansas, U.S. His family going to Canada, he entered McGill University, graduating in medicine in 1913, and spending the following years as interne at the Montreal General Hospital. He was then attached for short periods to the Women's Hospital and to the Royal Victoria Hospital, Montreal, and for the major part of a year prior to joining the C.A.M.C. was engaged as ship's surgeon. Arriving in England in June, 1916, he was in the following month

transferred to France to the 2nd Canadian General Hospital, and after service at this and the 2nd Canadian Stationary Hospital, was early this year made R.M.O. of a battalion, where his cheery disposition and capacity for dealing with men made him very popular. Captain Clark was unmarried.

OWEN HAIRSINE, M.R.C.S. ENG.,

MILITARY CROSS,

CAPTAIN, ROYAL ARMY MEDICAL CORPS.

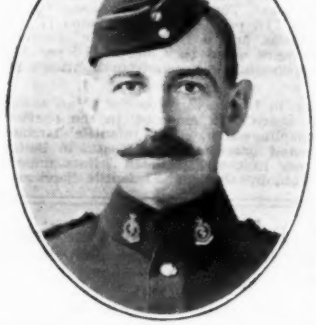
Captain O. Hairsine, who was killed in action on June 7th, at the age of 26 years, was youngest son of Herbert S. Hairsine, of West Hampstead. Educated at Tonbridge and the Middlesex Hospital, he qualified in 1914, and took a commission in the R.A.M.C., Special Reserve. He was in the retreat from Mons, being mentioned in despatches and receiving the Military Cross a year later. He had more than one narrow escape in the early days of the war when the dressing stations in which he was working were under shell fire, and his death, which occurred while he was bringing in a wounded man from the open, was instantaneous. His colonel wrote of him as a man of great value to the ambulance. Captain Hairsine was married a year ago.

FREDERICK WILLIAM HENRY DAVIE HARRIS, M.R.C.S. ENG.,

LIEUTENANT-COLONEL, ROYAL ARMY MEDICAL CORPS.

Lieutenant-Colonel F. W. H. D. Harris, whose sudden death occurred last month, was elder son of the late Commander W. H. Harris, R.N., and was educated at the Royal Naval School, New Cross. He completed his medical studies at University College, London, in 1880, and entered the R.A.M.C. five years later. He served for 20 years, dividing his time between India and Egypt. After the Boer War he received the King's and Queen's medals with clasps, being present at Stormberg and other engagements. For three years he was adjutant of the R.A.M.C. at Aldershot. On retiring in 1905 he was medical officer to the depôt at Bodmin, resigning that appointment to take up the secretaryship of the R.A.M.C. benevolent funds in London. At the outbreak of the present war he became the secretary of the Auxiliary R.A.M.C. Funds, which he assisted in establishing. He was also medical officer to the Army Clothing Department in London, and honorary treasurer to the R.A.M.C. Comforts Fund. He discharged his various duties almost up to the time of his death, his illness lasting a bare fortnight. A good comrade, a sportsman, and a sound man of business, his death will be regretted by numerous friends in all branches of the Army.

Colonel Harris leaves a widow, daughter of the late Major J. H. King, Royal Scots Greys, and two sons, both of whom are in the Army.



HENRY HAROLD ROBINSON, D.S.O., M.R.C.S. ENG.,

CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain H. H. Robinson, who was drowned when the transport *Transylvania* was torpedoed in the Mediterranean on May 4th, at the age of 40, was the younger son of H. Robinson, of Manchester. He was educated at Owens College, Manchester, qualifying in 1899, when he occupied resident appointments at Burton-on-Trent and Southport Infirmaries. He then settled in practice in Birkenhead, where he became honorary medical officer to the Birkenhead Children's Hospital, and an active member, sometime president, of the Birkenhead Medical Society. Although opposed to the principles of the National Health Insurance Act, when the Act became law he served on the panel and worked to the best of his ability to ensure its success. A fellow practitioner writes of Captain Robinson: "His loss means much to many. His patients lose his ever-ready and skilful aid, his colleagues an honourable practitioner of attractive brightness, his fellow townsmen one continually ready to do the best required of him. Brave, unselfish, and with a high sense of duty, he was beloved by his men in the Army, and held in high regard by his superior officers." Captain Robinson married in 1905 the daughter of the late J. C. Wann, J.P., and leaves a widow and two children. He was a contributor to the columns of THE LANCET.

DOUGLAS REID KING, M.B, CH.B. GLASG.,

MILITARY CROSS.

CAPTAIN, ROYAL ARMY MEDICAL CORPS.

Captain D. R. King, who was killed in action on June 7th, was the fourth son of the late John King, of Helensburgh and Cove, and was educated at Larchfield School. He studied medicine at Glasgow University, where he was a gold medallist, graduating M.B. and Ch.B. in 1914. Having entered the Special Reserve of the R.A.M.C. as lieutenant, he joined for duty on Sept 15th, 1914. He was mentioned in despatches in 1915 and received the Military Cross on June 3rd, 1917, four days before his death.

ANDREW VICTOR HONMAN, M.B., CH.B. MELB.,

MAJOR, AUSTRALIAN ARMY MEDICAL CORPS.

Major A. V. Honman, who was killed in France on May 20th, at the age of 26 years, was the son of Dr. Andrew Honman, one of the leading medical practitioners at Melbourne. He had a distinguished career at Melbourne University, graduating with honours in December, 1912. Volunteering for service on the outbreak of war, he left with the 2nd Australian Field Ambulance in October, 1914. With this unit he served at Gallipoli, and for good work at Suvla in August, 1915, was mentioned in despatches. At the time of his death he had been serving in France for about 12 months. Major Honman was by nature quiet and unassuming; he was much respected by his men for coolness and steadiness under fire and in difficult places. His loss will be keenly felt by many University and Service friends.

Obituary.

WILLIAM GEORGE TOTTENHAM POSNETT, F.R.C.S. IREL.

Mr. W. G. T. Posnett, whose death took place on June 17th at the early age of 46, had served both as civil and military surgeon in a variety of capacities. At Bloemfontein during the Boer War he was one of the operators at No. 8 General Hospital, performing there over 600 major operations. During the previous Zulu campaign he held a commission as surgeon-captain. Offering his services in August, 1915, to the French Red Cross, he served at Yvetôt for more than two months and received the warm recognition of the French Medical Service. In July, 1916, he was appointed by the War Office to examine recruits. He was then in the best of health, but often spoke of the bad ventilation and insanitary state of the recruiting stations. About Christmas-time he began to have fluctuations of temperature which he attributed to malaria. Gradually loss of weight, cough, and hoarseness necessitated treatment. A consultation on March 13th of two eminent specialists resulted in a diagnosis of tuberculous laryngitis and both lungs also affected.

Dr. Arthur Ransome, his father-in-law, who has sent us the details of Mr. Posnett's illness, writes that the extreme virulence of the infection was shown by the rapidity of its progress, and that he has drawn the attention of the medical officers of the London County Council and the Local Government Board to the risks their officers are running under the conditions prevailing at the recruiting stations.

THE SERVICES.

ROYAL NAVAL MEDICAL SERVICE.

W. P. Tew, C. de C. W. Langdon, W. L. Denny, J. J. Keatley to be temporary Surgeons.

ROYAL NAVAL VOLUNTEER RESERVE.

Surg. A. J. Gilbertson to be Staff Surgeon.
P. G. Fildes to be temporary Honorary Staff Surgeon.

ARMY MEDICAL SERVICE.

Col. O. R. A. Julian, C.B., C.M.G., to be temporary Surgeon-General.

ROYAL ARMY MEDICAL CORPS.

Temp. Col. W. Hunter (Capt., R.A.M.C., T.F.) reverts to the rank of temporary Lieutenant-Colonel on re-posting.

Lieut.-Col. (Temp. Col.) O. L. Robinson, C.M.G., relinquishes his temporary rank on re-posting.

To be temporary Colonels whilst employed as Assistant Directors of Medical Services of a Division: Lieut.-Col. A. G. Thompson, Bt. Col. Thomas W. Gibbard.

Majors relinquishing the acting rank of Lieutenant-Colonel on re-posting: A. M. Rose, D. P. Watson, R. C. Wilmot.

Temp. Major W. Bapty, Canadian A.M.C., to be temporary Major.

Capt. F. C. Davidson to be acting Lieutenant-Colonel whilst in command of a Field Ambulance.

Temp. Capt. R. Wilson to be temporary Major whilst in command of Troops on a Hospital Ship.

Temp. Capt. W. L. Maclean, Canadian A.M.C., to be temporary Major.

The undermentioned are granted temporary honorary rank whilst employed with No. 22 General Hospital:—As Major: K. Emerson. As Captains: F. Brigham, F. J. Caldwell, P. Gustafson, D. E. Ford. As Lieutenants: C. N. Lewis, W. S. Ramsey, L. M. V. Stone, D. J. Knowlton, G. W. Cottis.

Temporary Lieutenants to be temporary Captains: H. F. Ferguson, D. Gaston, H. M. Gray, K. Elmes, J. J. Shannon, A. Morton, T. S. Paterson, J. L. Torley, D. McLaren, W. W. Morrison, M. M. Frew, N. H. Smith, N. M. Cummins, G. Fehrsen, G. T. Garraway, R. H. Fleming, W. N. Montgomery, J. S. Kinross, C. B. Wise, F. W. Clark, J. Jaffé, J. R. P. McLaren, L. M. Davis, O. C. M. Davis, J. Cross, J. Glaister, Z. A. Green, H. R. Tighe, T. W. Bailey, J. G. Forbes, R. O. Lee, D. H. A. Galbraith, S. F. Harris, C. R. Reckitt, J. W. Thomas, W. S. King, T. O. Robson, A. E. Burroughs, J. A. Giles, H. S. McSorley, G. B. Archer, B. W. Mosher, L. W. Jones, H. J. C. Gibson, J. A. Edmond, E. J. Mannix, E. Lanzon, J. D. W. Beavis, B. Kennington, R. B. Bryan, J. F. Penson, G. O. Hutchinson, A. W. McGregor, C. Harris, H. C. A. Haynes, W. G. Johnson, B. C. Haller, S. N. Babington, A. Finlay, H. A. Colwell, J. E. McMillan, L. Blake, H. J. Davidson, W. H. Harvey, L. ap I. Davies, H. L. Shelton, V. L. Connolly, W. Steadman, B. V. Beaumont, H. F. Wilson, A. E. Gravelle, A. J. Bennee, W. P. H. Lightbody, J. C. Macaulay, J. A. Paterson, H. D. Gasteen, E. S. Molyneux, F. J. McCarthy, G. E. Chissell, J. T. Lloyd, S. Rodin, E. L. Steele, C. S. Tennant, I. Vandandaigue, F. R. Fraser, T. G. Elsworth, G. B. Bartlett, G. H. Culverwell, C. S. Thomson.

Officers relinquishing their commissions: Temp. Capts. H. A. G. Hadden (on account of ill-health, and is granted the honorary rank of Captain), A. E. Moore, S. H. M. Neave; Temp. Lieuts. W. A. Murray, E. E. Bryans, R. D. L. Greene, A. Campbell, P. L. Blaber, J. A. Hope, R. H. C. O. Wisdom, A. A. Halliday, J. Devine, S. F. Floyd, J. Crean, A. G. L. Smith, J. F. Walsh, A. P. Gibbons, J. B. McMorland, G. B. Ferguson.

SPECIAL RESERVE OF OFFICERS.

To be Lieutenants: L. J. Vincent, from University of London Contingent, O.T.C.; M. F. Murphy, from Royal College of Surgeons in Ireland Contingent, O.T.C.; J. Wilson, from Queen's University, Belfast Contingent, O.T.C.

Capt. S. J. Henderson relinquishes his commission on account of ill-health.

TERRITORIAL FORCE.

Major E. H. Cox to be acting Lieutenant-Colonel whilst commanding a Field Ambulance.

Major R. J. W. Oswald to be Lieutenant-Colonel on the permanent personnel.

Capt. (acting Lieut.-Col.) W. P. Ferguson relinquishes his acting rank on ceasing to command a Field Ambulance.

Capt. G. S. Williamson to be acting Lieutenant-Colonel whilst commanding a Field Ambulance.

Captains seconded for duty with a General Hospital: J. A. Innes, A. E. Campbell, F. G. Stuart, W. Alexander, A. A. McKenzie, A. J. Campbell, N. Hodgson, D. Cameron, J. Chalmers, E. McM. Dunlop, A. C. Hepburn, D. Campbell, J. W. Anderson.

Capt. A. W. Nuthall is seconded whilst holding a temporary commission in the R.A.M.C.

Lieutenants (temporary Captains) to be Captains: E. B. Kitching, J. W. Craven.

Lieut. H. Evers to be Captain.

R. T. Pearl to be Lieutenant.

Attached to Units other than Medical Units.—Major H. W. Williams to be acting Lieutenant-Colonel whilst commanding a Casualty Clearing Station; Capt. W. T. Rowe, from Army Medical Service, to be Major, and is seconded for duty with a General Hospital.

URBAN VITAL STATISTICS.

(Week ended July 7th, 1917.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 17,000,000 persons, the annual rate of mortality was 11·2, against 12·4 and 11·7 per 1000 in the two preceding weeks. In London, with a population exceeding 4,000,000 persons, the death-rate was 10·4, or 0·9 per 1000 below that recorded in the previous week; among the remaining towns the rates ranged from 3·3 in Ilford, 4·2 in Hastings, and 4·7 in Gillingham to 19·1 in South Shields, 19·8 in Wakefield, and 22·0 in Carlisle. The principal epidemic diseases caused 265 deaths, which corresponded to an annual rate of 0·8 per 1000, and included 114 from measles, 60 from infantile diarrhœa, 44 from whooping-cough, 32 from diphtheria, 11 from enteric fever, and 4 from scarlet fever. The deaths from measles showed a further decline compared with the numbers registered in the five preceding weeks, and caused the highest annual rates of 1·7 in St. Helens, 1·8 in Stockton-on-Tees, 2·3 in Walsall, 2·6 in Darlington, and 3·2 in Middlesbrough. The 642 cases of scarlet fever and the 1061 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital were respectively 36 and 10 above the numbers remaining at the end of the previous week. Of the 3629 deaths from all causes in the 96 towns 128 resulted from violence. The causes of 28 deaths were uncertified, and included 6 in Birmingham.

Scotch Towns.—In the 16 largest Scotch towns, with an aggregate population estimated at nearly 2,500,000 persons, the annual death-rate was 13·0, against rates steadily declining from 17·0 to 15·6 per 1000 in the seven preceding weeks. The 292 deaths in Glasgow corresponded to an annual rate of 13·6 per 1000, and included 17 from whooping-cough, 16 from measles, and 4 from infantile diarrhœa. The 72 deaths in Edinburgh were equal to a rate of 11·3 per 1000, and included 2 from whooping-cough and 1 each from diphtheria and infantile diarrhœa.

Irish Towns.—The 116 deaths in Dublin corresponded to an annual rate of 15·2, or 3·2 per 1000 above that recorded in the previous week, and included 3 from whooping-cough, 2 from infantile diarrhœa, and 1 each from enteric fever and measles. The 92 deaths in Belfast were equal to a rate of 12·2 per 1000, and included 2 from measles and 1 each from whooping-cough, diphtheria, and infantile diarrhœa.

THE Minister of Pensions has appointed Colonel Sir John Collie, R.A.M.C., to be Director of Neurasthenic Institutions.

DUBLIN UNIVERSITY MEDICAL SCHOOL AND THE WAR.—Speaking at a meeting held in aid of the Dublin University Voluntary Aid Hospital last week, Professor A. F. Dixon, dean of the medical school, quoted interesting figures as to the part played by past and present students of the School of Physic in the war. About 900 past or present students were employed in one or other of the services of the Crown. Since June, 1913, 199 men of Irish or British birth had qualified from Dublin University, and of these 196 had volunteered for service. In addition, 175 medical students had volunteered without waiting to qualify. Of the women graduates 7 were serving with the Royal Army Medical Corps. The records of honours showed that 135 past students of the School of Physic had been mentioned in despatches, 47 had been awarded the Military Cross, 2 had received bars to the Military Cross, 31 had received the Distinguished Service Order, 11 had received the honour of C.M.G., 10 of C.B., 1 of K.C.B., 1 of C.I.E., and 5 had received foreign decorations. The record is very remarkable and is in keeping with the great traditions of Trinity College.

Medical News.

SOCIETY OF APOTHECARIES OF LONDON.—At examinations held recently the following candidates were successful in the subjects indicated:—

PRIMARY EXAMINATION, PART II.

Physiology.—R. G. Addenbrooke, Birmingham; D. R. Ainsworth, Manchester; C. C. Becker, Guy's Hospital; B. C. Betts, Manchester; S. Blackman, London Hospital; J. P. Brown, Liverpool; C. E. G. Busbridge, University College Hospital; M. D. Cadman, St. Thomas's Hospital; G. W. Cheater, King's College; L. C. F. Chevens, St. Thomas's Hospital; G. L. Clements, Birmingham; A. B. Crane, London Hospital; D. A. Dias, Liverpool; A. G. Duncan, London Hospital; A. H. Hall, Birmingham; R. R. Halsall and G. R. D. Hankinson, Manchester; M. C. Hartley, London Hospital; A. Hesselberg, Liverpool; D. Hunter, London Hospital; E. T. Lloyd, Guy's Hospital; F. J. M. Larkins, Liverpool; G. P. Lindsay, Guy's Hospital; F. Lockwood, Liverpool; H. A. Lomax, Manchester; I. B. McCann, Guy's Hospital; M. S. Mahmud and G. P. Monk, Liverpool; C. F. Newman, Birmingham; E. G. Parkinson, Manchester; H. A. Potter, Middlesex Hospital; P. L. Richardson, Guy's Hospital; L. Samuels, Manchester; W. H. Summerskill, Guy's Hospital; M. Tree, London Hospital; W. H. Turner, Guy's Hospital; A. Williams, Bristol; D. C. Williams, London Hospital; E. F. Wilson, Guy's Hospital; G. A. P. Wright, Bristol; S. Wright, Middlesex Hospital; and J. E. Zeitlin, London Hospital.

Anatomy.—D. R. Ainsworth and B. C. Betts, Manchester; S. Blackman, London Hospital; H. Brown and J. P. Brown, Liverpool; C. E. G. Busbridge, University College Hospital; M. D. Cadman, St. Thomas's Hospital; G. W. Cheater, King's College; L. C. F. Chevens, St. Thomas's Hospital; G. L. Clements, Birmingham; D. A. Dias, Liverpool; A. G. Duncan, London Hospital; A. H. Hall, Birmingham; G. R. D. Hankinson, Manchester; M. C. Hartley, London Hospital; A. Hesselberg, Liverpool; D. Hunter, London Hospital; W. T. Johnson, Birmingham and Middlesex Hospital; M. A. R. Khalifa and E. T. Lloyd, Guy's Hospital; F. J. M. Larkins, Liverpool; G. P. Lindsay, Guy's Hospital; F. Lockwood, Liverpool; H. A. Lomax, Manchester; I. B. McCann, Guy's Hospital; G. P. Monk, Liverpool; H. A. Nathan, King's College; H. A. Potter, Middlesex Hospital; J. G. Reed, St. Thomas's Hospital; L. Samuels, Manchester; W. H. Summerskill, Guy's Hospital; M. Tree, London Hospital; A. A. Weinger, King's College; D. C. Williams London Hospital; E. F. Wilson, Guy's Hospital; S. Wright, Middlesex Hospital; and C. F. Young and J. E. Zeitlin, London Hospital.

UNIVERSITY OF ABERDEEN: INSTALLATION OF THE CHANCELLOR AND SUMMER GRADUATION.—On Friday, July 6th, the installation of the Duke of Richmond and Gordon, as Chancellor of the University of Aberdeen was held in Marischal College, the summer graduation being held at the same time. The proceedings were characterised with greater quietness on part of the students than is usually the case, and the ceremony was simple as befitted the times. The hall, however, was well filled, and there was a full attendance of the University staff. The Lord Provost and magistrates were also present. After taking the oath of fealty to the University, the new Chancellor took his place in the chair, and as the graduates in arts, science, and medicine were presented he capped and shook hands with each. The inaugural address was afterwards delivered. The following degrees in medicine were conferred:—

DEGREE OF DOCTOR OF MEDICINE (M.D.).

James Matthews Duncan and Robert Richards.

DEGREES OF BACHELOR OF MEDICINE (M.B.) AND BACHELOR OF SURGERY (CH.B.).

John Wilson Bowman, Frederick William Carter (distinction), Charles Alexander Harvey, Benjamin Wignall Jones, Duncan William MacKay, Achyuta Menon Mannatazhat, Arthur Young Milne, George Fowler Mitchell, Andrew George Reekie, Charles Reid (second-class honours), James Maxwell Savege, James Innes Watson, Charles Mayfield Wood, and William Lyall Yell (distinction).

The John Murray medal and scholarship, given to the most distinguished graduate (M.B.) of 1917, was awarded to George Reid McRobert.

UNIVERSITY OF GLASGOW.—At examinations held recently the following candidates passed in the subjects indicated:—

DEGREES OF M.B. AND CH.B.

(*M*) *Materia Medica and Therapeutics*, (*P*) *Pathology*, (*M.J.*) *Medical Jurisprudence and Public Health.*—John Smith Aitken, M.; Carl Otto Anderson, P.; John David Arthur, P.; Alexander Kidd Begg, M.; Alexander Shanks Bisset, P.; William George Burns, P.; James Caddies, M., P.; William James Simon Cameron, P.; Thomas Watson Carstairs, P.; John Gilchrist Coltart, M., P.; Harold Livingstone Coulthard, P.; Andrew Murdoch Davidson, P.; John Donald, P. (distinction); William Edgar, P.; Matthew Forsyth Gibson, M., P.; George Osmond Grant, P.; John Hewitt, M., P.; Humphrey Josh Hollis, P.; Robert Gold Howat, M., P.; John Alexander Jenkins, M.; Samuel Hemow Wolf Kamerasse, M., P.; John Kirk, P., M.J.; Archibald Campbell Lindsay, M., P.; Robert M'Courtney, P., M.J.; Donald Maclean, P.; Findlay Kerr Macmillan, P.; Allan Watt M'Rorie, P.; Robert Mair, M., P.; John M'Kean Maxton, M., P.; John Spence Meighan, P.; Modiri Silas Molema, M., P.; James Bennie Morrison, M., P.; Bryce Frood Niblock, P.; John Nicol, P. (distinction); John William Peden, P.; John Pollock, M., P.; James Morrison Ritchie, P.; William Scotland, M.; Herbert Harold Spencer, P.; Noel Eustace Stone, M., P.; John Brunton Sweet, M.; John Leonard Turpie, M.; James Alexander Walls, P.; Robert Kennedy Watt, M., P.; Robert Young, P.; and Stephen Young, M.

Women:—Helen Frances Allinson, P.; Susan Struthers Bryce, M., P.; Elizabeth Pace Cameron, M., P. (distinction); Mary Turner Liddell Clark, M., P. (distinction); Emily Loudon Clow, M., P.; Veronica Catherine Jessie Davies, M., P.; Edith Dennistoun Dobbie, P.; Charlotte Ann Douglas, M., P.; Margaret Hogg Grant, P.; Helen Hogg, M., P.; Alison Mary Hunter, P.; Alice M'Elwee, M., P.; Alice M'Glashan, M., P.; Annie Isabel Christian Maclardy, M.; Margaret Elizabeth MacLaren, M., P.; Mabel Mary Maclean, M., P.; Caroline Jane Maclennan, M., P.; Agnes Hislop Macwhirter, M., P.; Georgina Murdoch, M., P.; Kathleen Nicol, P.; Margaret Mitchell Paterson, M., P.; Louisa Evelyn Pigeon, M., P.; Helen Lennie Ralston, M., P.; Margaret Nelson Robertson, P.; Elaine Bessie Stuart Stocquart, M., P.; Muriel Amy Stowe, M., P.; Jean Banks Thomson, M., P.; Marion Thomson, M., P.; and Helen Barr Wilson, M., P.

New Medical Ordinance.—The following passed in Medical Jurisprudence and Public Health of the Fourth Professional Examination (in addition to the candidates under the Old Regulations named in the foregoing list):—

William Barras, Malcolm Chalmers, Kenneth John Alexander Gillanders, Edward Porteous Irving, Arthur Kennedy, Vida Johnston Perry, Ian Menteith Robertson, and John Joseph Robertson.

Lieutenant-Colonel G. Sims Woodhead, R.A.M.C.T., will give an address on Farm Colonies for the Tuberculous at the annual meeting of the National Association for the Prevention of Consumption to be held in the hall, 20, Hanover-square, London, W. 1, on Monday next, July 16th, at 5 P.M.

IN the winter session of 1916–17 there were 794 women studying medicine at the Prussian Universities, as against 705 in the corresponding session a year ago.

DONATIONS AND BEQUESTS.—By will the late Mr. Charles William Ware, of Ripon, Yorks, left, subject to a life interest, £4000 to the British Home and Hospital for Incurables, Streatham. The residue of the estate will go to the Royal Victoria Infirmary, Newcastle.

ANTI-MOSQUITO MEASURES IN CALCUTTA.—In a paper read at a recent meeting of the Calcutta Health Committee Dr. C. A. Bentley, Sanitary Commissioner for Bengal, emphasised the urgent necessity of controlling malaria in Calcutta, and of reducing the danger from all kinds of mosquito-borne diseases. He advocated the formation of a permanent anti-mosquito department to ascertain the prevalence of mosquito-borne diseases and educate public opinion in regard to the mosquito danger by a properly organised publicity campaign.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

Experiments on Living Animals.

ON the motion of Mr. BRACE, the Under Secretary at the Home Department, there has been ordered a return showing the number of experiments on living animals during the year 1916 under licences granted under the Act, 39 and 40 Vic., c. 77, distinguishing the nature of the experiments.

Military Service (Review of Exceptions) Act.

The Select Committee of the House of Commons which is inquiring into the working of the Military Service (Review of Exceptions) Act particularly in relation to medical examinations is continuing the taking of evidence. Mr. SHORTT is the chairman of the Committee.

On Thursday, July 5th, Colonel Sir J. BLAND-SUTTON, a member of one of the special medical boards and senior surgeon of the Middlesex Hospital, gave evidence. He dealt with the work of the special medical board, whose function it was to examine cases in which differences of opinions existed between medical recruiting boards on the one hand and the private medical advisers of the recruit or the specialists whom he had consulted on the other. Since October of last year until the present time the special board had examined 3449 men. In 289 cases the classification was raised, in 1202 it was confirmed, and in 1958 it was lowered. The 1958 contained 336 cases where the man was rejected for service altogether. He thought that it might be asserted that about 3 per cent. of the medical certificates produced by recruits might be described as not quite *bona fide*. He considered as serious the proportion of cases in which classifications had to be lowered by the special medical board. He regarded the 336 rejected cases as showing a seriously large percentage of error. He could not say whether the decisions of the medical boards with which the special board disagreed were formed too hurriedly or under great pressure of work. In cases where the special board had raised the classification it might be that the condition of the recruits might be improved since their examination by the ordinary medical boards. The principal complaints for which the special board had decided to reject men were epilepsy 48, mental deficiency 29, tuberculosis 62,

heart disease 917, and kidney disease 18. In reply to questions relating to the relative value of medical certificates placed before the board, Sir J. Bland-Sutton said that the family doctor generally made a dogmatic statement that a patient had some specific ailment and was unfit for military service, and that the certificates given by specialists were, as a rule, all verbiage and meant nothing, and the men paid double the ordinary fee for them.

Mr. PRINGLE brought to the notice of the witness the statement that a man fit to do work in civil life was fit to do some work in the Army.

Sir J. BLAND-SUTTON replied that he was unable to accept that principle without qualification. A man with a weak heart might make a fortune as a stockbroker, but if he were put in the Army he would drop down dead from exertion. Cases of that sort had occurred. He went on to say that if the special medical board found that a very glaring error had been committed by a medical recruiting board the president of the special board drew attention to it by a note on the back of the paper relating to the case. He also mentioned that when the special board passed a man for service in a particular class they did it on the assumption that he would be so employed.

Colonel LEWTAS, I.M.S. (retired), the president of No. 2 travelling medical board, gave evidence as to his experience with the medical examination of 35,000 recruits. In the event of differences of opinion arising between members of the board they were discussed, and in the few cases where they failed to come to a decision the opinion of the majority prevailed or the recruit was sent to a special hospital for examination.

The CHAIRMAN: As far as you know, have any steps been taken to let medical boards know of the Ministerial pledges in the House of Commons affecting the policy of the medical boards generally?

Colonel LEWTAS: I presume they would get that in the Army Council's instructions.

The CHAIRMAN: Do you know anything that contains a statement of Ministerial pledges?

Colonel LEWTAS: I do not know that I do. All we know about are the instructions coming from the Army Council.

Evidence of Surgeon-General Bedford.

On Monday, July 9th, Surgeon-General BEDFORD, Deputy Director of Medical Services in the Northern Command, gave evidence. He described the working of medical boards. He stated that the president must be in a position to supervise the whole work of the board and be consulted by the whole of the examiners in regard to difficulties. He must himself classify recruits. That came about on Feb. 23rd of this year. The presidents of boards in the Northern Command reported to him. His own experience had been entirely in the Army. He was of opinion that the regular officer made the best president.

The CHAIRMAN (Mr. SHORTT): Why?

Surgeon-General BEDFORD: Because he has intimate experience of the conditions of military service and of what is called for from the soldier in camp, barracks, and bivouac. He admitted that regular medical officers had in peace time no experience of passing men in the lower categories as they were not then accepted. The civilian practitioner had been trained all his life never to look further than the individual, and he was inclined to reject permanently men who were of potential value in the lower categories. In reply to a question whether the attention of the boards had been drawn to this, witness said that he had sent out in September of last year a memorandum on the subject. It was of a confidential nature.

The CHAIRMAN read the memorandum which called attention to the very large proportion of men found permanently unfit by some of the boards, and to the great variety of results shown in a comparison of the returns of the boards. It was emphasised that every man found permanently unfit by a board was lost to the Army, and he could not be called up for re-examination or service of any kind. In future boards must understand that any man who was of any potential use to the Army for fighting, marching, digging, hauling, cooking, engine-driving, motor-driving, or as a draughtsman, tailor, electrician, baker, telegraphist, or a member of one of the trades or occupations necessary for the maintenance of the Army must be taken and placed in one category or another, and must not be permanently lost to the Army by being found unfit. Some boards were alive to this. Other boards were allowing enormous numbers of men to slip through their hands and become lost to the service. This must now cease and all boards must approximate their percentage of rejections to the lowest figures of the category appearing in the returns under review. Was there any difficulty (the CHAIRMAN asked) in getting that order acted upon by civilian doctors?

Surgeon-General BEDFORD: I think the boards responded to it very well. The memorandum was issued after a meeting at the War Office, which, he thought, took place in September.

The CHAIRMAN: Was it agreed that a memorandum should be sent out?

Surgeon-General BEDFORD: The general purport of the meeting was that there was a preventible leakage on account of the high percentage of rejections.

The CHAIRMAN: Did Sir Alfred Keogh know that you were to send this out?

Surgeon-General BEDFORD: I presume that he must have known that we were to do something to interpret the policy of the War Office with regard to this high percentage of permanently unfit.

The CHAIRMAN: You took it at the meeting that it was understood something should be done?

Surgeon-General BEDFORD: Yes.

The CHAIRMAN next took up a circular letter sent out by Surgeon-General Bedford on June 22nd, in which it was stated that men were being passed who were of no potential use to the Army. He had (the letter proceeded) been inspecting certain labour units, and he was shocked to see the specimens of humanity who had been accepted as of potential value to the Army—men almost totally blind, deformed, of the poorest physique, cases of severe rheumatism, cases of paresis which rendered locomotion almost grotesque, and several cases of insanity. This scandal must be stopped at once. Unless a recruit was of some potential value to the Army he should be rejected.

Surgeon-General BEDFORD explained that this communication was made after he and the general officer commanding had made an inspection of a labour battalion. He presumed that the pledges of Ministers would be communicated in the form of instructions from the Army Council.

In answer to Sir GODFREY BARING, Surgeon-General BEDFORD stated that the labour units which he inspected before the issue of the circular letter were the dregs of an enormous command, and they were taken out of very large numbers of men indeed. He thought on the whole the work of the boards had been good.

Sir GODFREY BARING: Do you now think the word "scandal" is too strong?

Surgeon-General BEDFORD: Yes. I should not have used the word "scandal." I was very much annoyed when I saw the particular units in question. They are the dregs of an enormous number of men, and when you have regard to these numbers the cases in question formed a minute proportion of the whole.

Surgeon-General JENCKEN, of the Eastern Command, also gave evidence. He stated that he had had many complaints as to the Mill Hill board, but he regarded them as unjustifiable. He was asked by the committee to furnish the correspondence on the subject of the complaints.

The Southern and Scottish Commands.

On Tuesday, July 10th, Surgeon-General BIRRELL, D.D.M.S., Southern Command, gave evidence. He spoke of the system of medical boards in that area. His experience was that the percentage of rejections varied very much, but some of the boards worked in agricultural and others in town districts. The percentage of rejections was much larger in the towns than in the country, and he thought that was due to the difference in the physique of the men. In cases of doubt the presidents of boards decided in consultation with the members. A president did not decide against the opinion of his board. The Army Council had issued an instruction that the president was to classify recruits, but he would do that after consultation with the boards. Witness went at considerable length into the administrative work of his office.

Replying to Mr. PRINGLE, Surgeon-General BIRRELL said that in his view a man should be put into the category for which he was fit at the time he was examined. The standard of fitness for general service had not been lowered, but some disabilities for which men were formerly rejected were not now considered as sufficient for disqualification. A medical board would attach importance to a certificate given by a man's own medical man, but he admitted that an Army Council instruction forbade civilian practitioners who had received commissions giving such certificates.

Mr. PRINGLE remarked that this would prevent large numbers of men producing the only evidence which they could otherwise obtain from a medical man.

The CHAIRMAN read two circular letters. One, it was stated, was sent out by Sir Alfred Keogh, Director-General of Medical Service, to the Deputy Directors of Medical Service. It was dated July, 1915, and it ran:—

I wish you to regard what I say as confidential. It is imperative for you to get as many men as possible not fit for war service put into a category as fit for garrison service abroad. We have so many civilian medical men working with us that you will have to be very strong in your action as regards the acceptance of their opinion when they reject men as unfit for garrison service abroad. This is a time when only very severe disability—heart disease, kidney disease, and so on—should be regarded as rendering men unfit. All those disabilities which in peace time we have been accustomed to consider should now go to the wall—varicocele, varicose veins, hammer toes, and a hundred and one other things which do not incapacitate men for ordinary garrison work. I would not write to you on this subject if the matter were not one of primary importance, concerning which Lord Kitchener is very anxious. Take it upon yourself to overrule decisions which place men in categories as unfit

for garrison service abroad for disabilities only which do not incapacitate very completely.

Surg.-General BIRRELL said that he had not seen this letter

The CHAIRMAN then read another letter from Sir Alfred Keogh issued after the meeting at the War Office in September, 1916. This letter said:—

Please issue orders to medical boards in your command that they are not totally to reject any man who can perform any kind of work without danger to himself or to others. Sedentary work does not mean clerical work only. It means any class of work which a man can do not involving the class of duties appropriate for other categories. Every man who can earn a livelihood in civil life can do something in the Army and it is perfectly ridiculous the continuance of these enormous numbers of rejections in each command. Will you please stop it at once and give very definite orders to your boards?

Surgeon-General BIRRELL said that on receipt of this letter he sent out a telegram saying that no man must be totally rejected for the Army who was fit for any work in it.

Surgeon-General CULLING, D.D.M.S., Scottish Command, was also called as a witness. It was not the case, he said, that in his command the policy was followed of inculcating into medical boards that owing to the difficulty of securing men for the higher categories they should turn the scale against the individual and in favour of the Army in cases where there was doubt. He was present at the War Office meeting of surgeons-general in September of last year, and he had afterwards issued a circular to presidents of medical boards that they were not to reject any men who could perform any kind of work without danger to themselves and others. It stated that the enormous number of rejections in his command ought to stop at once. He had not personally gone previously into the number of rejections in his command. A document dealing with heart murmurs had also been sent out from his office.

Answering Mr. PRINGLE, he admitted that the circular which he had sent out was done automatically as the result of the meeting in London. It was not confidential and it was marked "Urgent."

On Wednesday, July 11th, Surgeon-General HATHAWAY gave evidence as to the medical boards in the Western Command.

HOUSE OF COMMONS.

WEDNESDAY, JULY 4TH.

Lieutenant-Colonel Carter, I.M.S.

Answering Sir J. JARDINE and Mr. HOUSTON, Mr. CHAMBERLAIN said: Major Carter has suffered no injury and will suffer none in his career on account of the efforts which he made to bring to notice and to secure a remedy for the deplorable defects in the medical arrangements in Mesopotamia. I am only waiting till the copies of the report of the Commission can reach India to bring his conduct to the notice of the Government of India with a view to his services receiving suitable recognition. Meanwhile I may say that on account of his special knowledge and experience he was sent home in May, 1916, to advise as to the fitting out of hospital ships, &c., building in this country for Mesopotamia, and he has been engaged on this and similar work at the War Office ever since. Far from desiring to penalise him, the Government of India has more than once applied for his services, but on each occasion the War Office replied that he could not be spared from the valuable work he is now doing. Major Carter was granted the temporary rank of lieutenant-colonel on August 8th, 1916. He held the rank of major for three years previous to that date. He joined the Indian Medical Service from this country in 1902 at the age of 26.

Medical Board of the India Office.

Mr. CROOKS asked the Secretary for India whether the decisions of the medical board of the India Office were decided by a majority of the members; whether he would consider the advisability of adding a civilian doctor of eminence; and whether some provision for appeal against a decision or for a re-hearing could be made, in view of the fact that a decision at the present time, against which no appeal could be made, might in error cut short a promising career in the Indian Service.—Mr. CHAMBERLAIN answered: The India Office medical board consists of a president and one member. Their reports are submitted under their joint signatures. In the event of a difference of opinion that of the president would, no doubt, prevail. A suggestion that a civil medical practitioner should be added to these two I.M.S. officers was considered by me in Council about 18 months ago, but it was considered that there were not sufficient grounds for enlarging the present board. Having regard to the special character of their duties, I attach importance to the possession by members of the board of experience of the Indian climate and conditions. I am not aware of any such case having occurred as that suggested in the last part of the question. But if the honourable Member can give me particulars I will look into it. The practice of the board in all doubtful cases is to give the officer the benefit of the doubt, especially when pay or pension is involved.

Prisoners of War in Turkey.

Replying to Mr. MARRIOTT, Mr. J. F. HOPE (representing the War Prisoners Department) said: His Majesty's Government is unfortunately aware that there has been a very high rate of mortality among all the British non-commissioned officers and men, prisoners of war in Turkey, and constant representations have been made to the Turkish Government with a view to the improvement of their condition. The Ottoman Government recently consented to a concentration at one or two camps of all invalid prisoners of war with a view to better medical attention, but His Majesty's Government has yet to learn to what extent this measure has been carried out and what benefit has ensued from it. The prisoners of war in the Taurus and Amanus regions are being attended by British medical officers.

Military Hospitals in Oxford.

Mr. MARRIOTT asked the Under Secretary for War whether patients suffering from malarial fever were being sent for treatment to the military hospitals in Oxford; if so, whether Oxford had been specially selected for the treatment of patients suffering from this disease; and would he state the grounds upon which this selection had been made.—Mr. MACPHERSON replied: The answer to the first part of my honourable friend's question is in the affirmative. With regard to the remaining parts of the question a hospital in Oxford is one of a number of hospitals in the United Kingdom in which cases of malaria are being treated by specially qualified medical officers. The hospitals referred to were selected as convenient centres on the advice of the leading malaria experts.

Regulation Flour and Health.

In reply to Mr. ALLEN BAKER and Mr. HASLAM, Mr. BRIDGEMAN (speaking on behalf of the Ministry of Food) said: An expert committee is now engaged in the investigation of all questions relating to the effect which the Government regulation flour has upon the health of the community. The conclusion so far is, that while bread made from this flour, when properly baked, is perfectly wholesome, there are unavoidable local variations in the flour used and in the methods of bread-baking, and that these points require constant attention. It is inevitable that in the manufacture and use of a new and unfamiliar material for bread difficulties should arise, but I see no reason why difficulties which have occurred and been overcome in other countries should not be overcome here. In any case, having regard to the prospective supplies, there is no likelihood of being able either to lessen to any substantial extent the percentage of extraction from wheat or to admit the manufacture of a pure white flour.

Sterilised Meat in Scotland.

Mr. MUNRO (Secretary for Scotland), in reply to Mr. ANDERSON, wrote: I understand that the local authorities at Glasgow, Dundee, Hamilton, and Aberdeen have made, or are considering, arrangements for sterilising parts of specially selected carcasses of tuberculous animals for sale to the general public. The methods adopted have the approval of the Local Government Board for Scotland, who are satisfied that the selection of carcasses and the methods of sterilisation are such that the meat is rendered harmless and may be consumed without injury to health; and that it forms a useful addition to the food-supply of the country.

THURSDAY, JULY 5TH.

The Gratuity to Retiring Naval Surgeons.

Mr. HOHLER asked the Secretary to the Admiralty—

Whether the position of a naval surgeon retiring before the war with a gratuity was as follows: that the Admiralty had no further claim on his services, that as a voluntary act on his part he could place his name on an emergency list which in case of his being called upon to serve would entitle him to the rate of pay he was receiving when he retired plus a bonus of 25 per cent., and that for this voluntary act he received no extra gratuity or reward of any kind; whether he was aware that some ten or more naval surgeons who had retired before the war with a gratuity, and who had placed their names on the emergency list, had been called upon to serve but were not receiving the pay promised, the Admiralty claiming to deduct, and deducting, from their pay a sum equal to the interest on their gratuity, and would he refer to any statute, regulation, or Order in Council made before the war that justified this; if not, would he at once direct the repayment of the sums illegally deducted with interest at 5 per cent. to these naval surgeons; and would he state on what principle this deduction had been made and the rate of interest taken.

Mr. MACNAMARA answered: The position of the officer in question is indicated in the first part of the question. On being called out he receives (1) the rate of pay earned prior to withdrawal, and (2) a bonus of 25 per cent. in lieu of any further retiring allowance. The gratuity paid on withdrawal is in effect a commuted allowance and is comparable with the annual allowance payable to officers retiring under other conditions. The bonus is paid to both the emergency officer and the retired officer when re employed and when the latter has his retiring allowance suspended, it is consistent to deduct the annual value of the gratuity received by the former officer. The authorising regulation is Order

in Council, May 13th, 1901, No. 157, under which the Treasury has approved both the payment of the bonus and the deduction referred to. Any doubt as to the legality of the decision regarding the latter would, therefore, be equally applicable to the former. The annual value of the gratuity is calculated on the basis of the cost of an immediate life annuity at the date of the withdrawal under the Post Office annuity table in force at the time.

Mr. HOHLER: Does the right honourable gentleman think you ought to give a man a gratuity and subsequently charge interest on it when the man rejoins on his own initiative?—Mr. MACNAMARA: The heart of the matter is this. The gratuity is considered to be a commuted allowance. The officer retired on allowance and re-employed got his allowance suspended. So it is deemed equitable to deduct the annual value of the gratuity from the officer retired on the same.

Mr. HOHLER: Has not the gratuity been used to get a practice?—Mr. MACNAMARA: I should be glad if my honourable and learned friend would argue his view, for which I have always much respect, before our Medical Director-General, the Accountant-General, and myself.

Medical Women Employed in France.

Mr. CURRIE asked the Under Secretary for War—

What differences, if any, as to rank, messing, gazetting, pay, allowances, badges, pensions, and status generally existed between medical men belonging permanently or temporarily to the Royal Army Medical Corps and duly qualified medical women employed, or about to be employed, in France or elsewhere abroad; whether an assurance could be given that any outbreak of illness amongst women attached as workers to our Army in France would be adequately dealt with; and whether Sir Alfred Keogh, as chief of the Army Medical Service, was the authority officially responsible for the medical care of women so serving.

Mr. MACPHERSON wrote in reply: The complete details as to pay, allowances, pensions, &c., are not yet settled. The Director-General, Army Medical Service, Sir Alfred Keogh, is responsible for the employment of these ladies and for dealing with illness amongst them.

Tuberculosis Schemes in Ireland.

Mr. PATRICK MEEHAN asked the Chief Secretary for Ireland whether he was aware that the grants made to the Queen's County Insurance Committee for sanatorium benefit for insured persons were inadequate and had been decreasing annually for the past five years; whether he was aware that the reduction of the grants had deprived insured persons of benefits to which they were entitled; and whether he intended taking any action in the matter.—Mr. DUKE wrote in reply: The returns of expenditure made by county councils in connexion with tuberculosis schemes indicate that there is a falling-off in the estimated receipts from the Insurance Committees in respect of the treatment of insured and exempt patients in the current year as compared with last year. The consequent deficit will fall equally on the Exchequer Maintenance Grant and the local rates. The question of grants for sanatorium benefit can only be dealt with by the National Health Insurance Commission.

Appointments.

Successful applicants for vacancies, Secretaries of Public Institutions, and others possessing information suitable for this column, are invited to forward to THE LANCET *Office, directed to the Sub-Editor, not later than 9 o'clock on the Thursday morning of each week, such information for gratuitous publication.*

ALDOUS, G. F., F.R.C.S. Edin., has been appointed Consulting Surgeon to the Kingsbridge Cottage Hospital.

HAYTON, C. H., F.R.C.S., Honorary Assistant Surgeon to the Ear, Nose, and Throat Department at the Prince of Wales's General Hospital, Tottenham.

Vacancies.

For further information regarding each vacancy reference should be made to the advertisement (see Index).
When the application of a Belgian medical man would be considered the advertisers are requested to communicate with the Editor.

ABERDEEN ROYAL ASYLUM.—Temporary Assistant Physician. Salary from £250 to £350 per annum, with board, &c.

BATH COUNTY BOROUGH.—Temporary School Medical Officer. Salary £500 per annum.

BIRKENHEAD BOROUGH HOSPITAL.—House Surgeon. Salary £250 per annum and war bonus, board, &c.

BIRMINGHAM GENERAL DISPENSARY.—Temporary Tuberculosis Officer. Salary £600 per annum.

BOURNEMOUTH, ROYAL NATIONAL SANATORIUM FOR CONSUMPTION AND DISEASES OF THE CHEST.—Resident Medical Officer and Clinical Tuberculosis Officer. Salary £430 per annum, with board, &c.

BOURNEMOUTH, ROYAL VICTORIA AND WEST HANTS HOSPITAL, Poole-road—Resident House Surgeon for six months. Salary £250 per annum, with board, &c.

BRISTOL ROYAL INFIRMARY.—House Physician and House Surgeon. Salary at rate of £120 per annum, with board, &c.

DEVONPORT, ROYAL ALBERT HOSPITAL.—House Surgeon Salary £200 per annum, with board, &c.

DURHAM COUNTY COUNCIL.—Female Assistant School Medical Officer. Salary £300 per annum, &c.

HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST, Brompton.—Resident Medical Officer. Salary £200 per annum, with board, &c. Also Assistant Resident Medical Officer. Salary £100 per annum, with board, &c. Also House Physician for six months. Salary 30 guineas.

INSURANCE COMMITTEE FOR THE COUNTY OF LONDON.—Medical Adviser.

ITALIAN HOSPITAL, Queen-square, London, W.C.—House Surgeon for six months. Salary £150 per annum, with board, &c.

LIVERPOOL EYE AND EAR INFIRMARY, Myrtle-street.—Female House Surgeon.

MACCLESFIELD GENERAL INFIRMARY.—House Surgeon. Salary £200 per annum, with board, &c.

MANCHESTER, HULME DISPENSARY, Dale-street, Stretford-road.—House Surgeon. Salary £250 per annum, with apartments, &c.

MARGATE, ROYAL SEA BATHING HOSPITAL FOR SURGICAL TUBERCULOSIS.—Surgeon. Salary, if resident, £150 per annum, with board, &c.; if non-resident, salary at rate of £250 per annum

METROPOLITAN BOROUGH OF BETHNAL GREEN.—Female Assistant Medical Officer of Health. Salary £400 per annum.

NATIONAL HOSPITAL AND UNIVERSITY COLLEGE HOSPITAL SCHOOL OF MASSAGE AND ELECTRICAL TREATMENT, Queen-square, W.C.—Female Head of the School. Salary £200 per annum, with board, &c.

NETLEY, WELSH HOSPITAL.—Medical Officer. Salary £400 per annum, with board, &c.

NORTHAMPTONSHIRE WAR HOSPITAL.—Resident Medical Officer. Salary £1 daily, with board, &c.

QUEEN'S HOSPITAL FOR CHILDREN, Hackney-road, Bethnal Green, E.—House Physician for six months. Salary £100 per annum, with board, &c.

QUEEN MARY'S HOSPITAL FOR THE EAST END.—House Surgeon.

ROYAL FREE HOSPITAL, Gray's Inn-road, W.C.—House Physicians. Salary £50 per annum, with board, &c.

ROYAL LONDON OPHTHALMIC HOSPITAL, City-road, E.C.—Third House Surgeon. Salary at rate of £50 per annum, with board, &c.

ST. ANDREW'S HOSPITAL, Dollis Hill, London, N.W.—Resident Medical Officer for six months. Salary £323 15s., with board, &c.

SHEFFIELD ROYAL INFIRMARY.—House Physician. Salary £120 per annum, with board, &c. Also Two House Surgeons. Salary £120 per annum, with board, &c.

SOUTH LONDON HOSPITAL FOR WOMEN, South Side, Clapham Common, S.W.—Female House Physician for six months. Salary at rate of £100 per annum, with board, &c. Also Anæsthetist for Tuesday afternoons. Salary 10s. 6d. per attendance.

SUNDERLAND COUNTY BOROUGH EDUCATION COMMITTEE.—Temporary School Medical Officer. Salary £450 per annum.

WEST RIDING OF YORKSHIRE, MIDDLETON-IN-WHARFEDALE SANATORIUM, near Ilkley.—Assistant Resident Medical Officer. Salary £325 per annum.

WINCHESTER, HAMPSHIRE COUNTY COUNCIL.—Temporary Assistant County Medical Officer of Health. Salary £300 per annum.

NOTICE is given of a vacancy for a Medical Referee under the Workmen's Compensation Act, 1906, for the Macclesfield and Congleton and Sandbach County Courts in County Court Circuit No. 9. Applications should reach the Private Secretary, Home Office, not later than August 2nd next.

Births, Marriages, and Deaths.

BIRTHS.

DAVISON.—On July 3rd, at a private nursing home, the wife of H. Glen Davison, M.D., Captain, R.A.M.C., of a daughter.

EDWARDS.—On July 6th, at Grosvenor-street, Mold, North Wales, the wife of Roger B. Edwards, M.B., B.S., of a son.

PITT.—On July 1st, at St. Hildas, 325, Hoe-street, Walthamstow, the wife of W. O. Pitt, M.D., D.P.H., of a son.

SWAN.—On July 6th, at Wimpole-street, W., the wife of R. H. Jocelyn Swan, M.S. Lond., F.R.C.S., Major, R.A.M.C., of a daughter.

WANKLYN.—On July 7th, at a nursing home, Worthing, the wife of Captain W. McC. Wanklyn, R.A.M.C., of a daughter.

MARRIAGES.

SIMSON—HOOPER.—On July 7th, at St. Andrew's, Ashley-place, Lieutenant-Colonel Harold Simson, R.A.M.C., to Lilian Sybil Doulton, only daughter of Mr. and Mrs. Kinnersley Hooper, of Little Tangley, Wonersh, near Guildford, and St. James's Court.

WATSON—HAMENDT.—On June 16th, at New St. Andrew's Church, Toronto, Benjamin Philp Watson, M.D., F.R.C.S.E., F.A.C.S., Professor of Obstetrics, University of Toronto, to Angèle, daughter of Monsieur and Madame Hamendt, St. Nicolas, Belgium.

DEATHS.

ATKINSON.—On July 7th, suddenly, at Claremont, Felixstowe, Lieutenant Ambrose Atkinson, R.A.M.C., aged 57.

GREER.—On June 16th, killed in action, Captain Morrice Greer, R.A.M.C.

MACKINLAY.—On July 1st, at The Green House, Coatham, Redcar, James Egan Harris n Mackinlay, M.R.C.S., L.R.C.P., J.P.

PILCHER.—On July 3rd, at Gloucester-road, S.W., Colonel J. G. Pilcher, F.R.C.S., I.M.S. (retired), in his 79th year.

WHINCUP.—On July 2nd, in France, accidentally drowned, Lieutenant Frank Whincup, R.A.M.C., of Shrewsbury, aged 43.

N.B.—A fee of 5s. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Short Comments, and Answers to Correspondents.

HEELS AND HEALTH.

IT appears that the Legislature of Illinois has fixed a maximum height for heels of one inch and three-eighths. 70 per cent of the women concerned appear to wear heels two inches high, and the majority of the remainder heels of one inch and five-eighths. The order has been made on the grounds of economy. Heels are not seen in ancient footgear, and not all the men wore footgear at all, so that their abuse is a comparatively modern one. Military men have generally worn different boots according to rank, while men of lower rank went barefooted in all early civilisations, chalking their feet or using other preparations. At times women have made use of wooden soles raised some inches from the ground, but these were really low stilts and not high heels. The present-day high heels are often called Louis XV. heels, and the name strictly refers more to the shape of the heel which has the curves introduced at that flamboyant epoch, regardless of all orthopædics. A heel which has become somewhat popular during the last few years is the straight-backed heel, or, as it is called, the "Cuban" heel. If the heel is not sufficiently broad the foot wobbles at each step, hesitating and trying to find its balance like the foot of a poor tight-rope walker. This is a strain on the tendons of the foot and the weak ankle. The height of heels has a medical bearing, and having regard to some of the footgear which fashion exposes among modern women with unusual frankness, we suggest that this bearing is lost sight of.

THE CAUSATION OF SEX.

To the Editor of THE LANCET.

SIR,—In your notice of Mr. Dawson's book in your issue of July 7th you observe that Mr. Dawson contends "that male ova come exclusively from the right ovary and female ova from the left ovary." About 26 years ago I removed the right ovary from a lady about 40 years of age whose menses had been suppressed for two years. Four weeks after the operation she menstruated once and then became pregnant, giving birth to a girl (still living and a mother). After this in due time she became pregnant again and gave birth to a boy who was married two years ago. The lady is still living.

I am, Sir, yours faithfully,

J. E. BURTON,
Consulting Surgeon, Hospital for Women, Shaw-street, Liverpool.

July 10th, 1917.

A BELGIAN DOCTOR'S VIEW OF SOCIAL MEDICINE IN ENGLAND.

IN a recent number of the *Archives Médicales Belges* Dr. René Sand, medical officer in charge of the Ambulance at La Panne, writes with appreciation of the efforts at social amelioration which are being made in this country during the war. His conclusion is as follows:—

> Le plus grand changement qui soit survenu en Angleterre dans ces deux dernières années n'est pas, comme pourrait le croire un esprit superficiel, l'institution du service militaire obligatoire—il n'est qu'une innovation—c'est la naissance d'un esprit public nouveau, qui repousse les palliatifs, n'accepte plus de temporiser, mais taille ses revendications à la mesure de l'intérêt général. Le coût des réformes sociales, leur amplitude, leur nouveauté faisaient hésiter l'Anglais de 1914. Mais la guerre lui a appris à compter par milliards de livres et par millions d'hommes; elle l'a contraint à résoudre en quelques semaines des problèmes aussi complexes que l'alimentation d'une nation entière; elle l'a habitué à l'action méthodique, coordonnée, disciplinée; elle lui a enseigné la hardiesse, la rapidité, le sacrifice des intérêts individuels; elle lui a montré les bienfaits de l'organisation, préparant ainsi aux réformes le terrain le plus favorable. Déjà pendant la guerre bien des innovations ont été introduites. Mais c'est dans la création d'un esprit nouveau que réside le plus beau gage d'avenir.

THE ECONOMIC PRODUCTION AND DISTRIBUTION OF MILK.

WITH reference to our observations on the keeping properties of condensed milk in a leading article under the above heading in our issue of last week, Messrs. Nestlé and Anglo-Swiss Condensed Milk Company, of 6 and 8, Eastcheap, London, E.C., who are well known as the largest producers in Europe and elsewhere of both the sweetened (not containing more than 40 per cent. of cane sugar) and unsweetened variety of full-cream condensed milk, write that: "1. Sweetened condensed milk, when properly made, will keep perfectly good for 9, 12, or more months, but as it is the object to preserve it during the summer for use during the winter, a maximum period would not exceed nine months between production and consumption. 2. Unsweetened condensed milk relies on complete sterilisation for its keeping properties and is guaranteed in any climate for two years, while it will keep intact for any period beyond that so long as the tin is unopened. 3. The economy in sugar, *qua* sugar, is such when sweetened condensed milk is used that so long as there is sugar to use for condensing whole milk the cost of a tin of milk compares favourably with the prices of the sugar and raw milk it contains." These observations are of special interest in view of the urgent need of preserving present supplies, while they are plentiful, in order to make up for the shortage of the coming winter.

S. D. S.—The literature is copious, but the best works are necessarily not written for lay readers.

T. C. next War.—The inequality to which attention is drawn has more than once been brought to the notice of the authorities.

G. B.—All preparations of paraffin tend to cause indurations when injected into the tissues. In the case of mercurial injections the quantity of liquid paraffin is so small that induration rarely results; theoretically at least a true oil should be preferable for the preparation of a mercurial cream.

F. C. P.—The important word "not" was dropped out, as fortunately the context shows. We are obliged for having the error pointed out. "Accustomance," the word of the learned lecturer, is in the Imperial Dictionary; "informatory" is now a much-used adjective.

Medical Diary for the ensuing Week.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.
MEETING OF SECTION.
Thursday, July 19th.

DERMATOLOGY (Hon. Secretaries—J. E. R. McDonagh, Henry MacCormac): at 5 P.M.
Cases (at 4.30 P.M.).
Dr. Parkes Weber: (1) Macular Atrophy of the Skin associated with Ordinary Vitiligo; (2) Hirsuties in a Child; (3) Unilateral Striæ Atrophicæ of the Thorax (photograph).
And other cases.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.
MONDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye. Dr. Simson: Diseases of Women.
TUESDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.
WEDNESDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.
THURSDAY.—2 P.M., Medical and Surgical Clinics. X Rays. Mr. Gray: Operations. Mr. B. Harman: Diseases of the Eye.
FRIDAY.—10 A.M., Dr. Simson: Gynæcological Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Baldwin: Operations. Dr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Diseases of the Skin.
SATURDAY.—10 A.M., Dr. Saunders: Diseases of Children. Dr. Banks Davis: Operations of the Throat, Nose, and Ear. Mr. B. Harman: Eye Operations. 2 P.M., Medical and Surgical Clinics. X Rays. Mr. Pardoe: Operations.

ROYAL INSTITUTE OF PUBLIC HEALTH, Lecture Hall of the Institute, 37, Russell-square, W.C. 1.
Course of Lectures and Discussions on Public Health Problems under War and After-war Conditions:—
WEDNESDAY.—4 P.M., Lecture XIV.:—Lieut.-Col. S. M. Copeman, R.A.M.C.(T.F.): Sanitation in War Time. Followed by a discussion.

EDITORIAL NOTICES.

IT is most important that communications relating to the Editorial business of THE LANCET should be addressed *exclusively* "TO THE EDITOR," and not in any case to any gentleman who may be supposed to be connected with the Editorial staff. It is urgently necessary that attention should be given to this notice.

It is especially requested that early intelligence of local events having a medical interest, or which it is desirable to bring under the notice of the profession, may be sent direct to this office.

Lectures, original articles, and reports should be written on one side of the paper only, *and when accompanied by blocks it is requested that the name of the author, and if possible of the article, should be written on the blocks to facilitate identification.*

MANAGER'S NOTICE.

TO COLONIAL AND FOREIGN SUBSCRIBERS.

Subscribers abroad are particularly requested to note the rates of subscriptions given on page 6.

The Manager will be pleased to forward copies direct from the Offices to places abroad at the rates shown, whatever be the weight of any of the copies so supplied.

METEOROLOGICAL READINGS.

(Taken daily at 8.30 a.m. by Steward's Instruments.)

THE LANCET Office, July 11th, 1917.

Date.	Rainfall.	Solar Radio in Vacuo.	Maximum Temp. Shade.	Min. Temp.	Wet Bulb.	Dry Bulb.	Remarks.
July 5	...	112	70	54	51	55	Cloudy
,, 6	...	113	72	54	53	58	Overcast
,, 7	...	118	74	54	60	65	Fine
,, 8	0·10	64	62	57	56	57	Raining
,, 9	0·69	104	65	52	52	53	Overcast
,, 10	0·30	116	67	50	53	59	Cloudy
,, 11	...	104	70	53	54	56	Fine

Other information which we have been accustomed to give in these "Readings" is withheld for the period of the war.

Communications, Letters, &c., have been received from—

A.—Dr. T. D. Acland, Lond.; Aberdeen University, Sec. of; Dr. G. Hely-Hutchinson Almond, Bath; Mr. J. V. Arkle, Lond.; Messrs. Arnold and Sons, Lond.; Mr. E. Arnold, Lond.; Abbott Laboratories, Chicago, Librarian of; Mr. R. Ashby, Carlisle; Aberdeen Royal Asylum, Clerk and Treas. to the; Aberdeen Public Library, Librarian of; Mr. S. E. Atkinson, Osgathorpe.

B.—Mr. J. Burns, Edinburgh; Dr. A. H. Bizarro, Whitchurch; Dr. F. J. F. Barrington, Lond.; Dr. J. Burns, Lond.; Mr. J. E. Burton, Liverpool; Dr. M. M. Bird; Mr. A. W. Bromley, Lond.; Prof. F. A. Bainbridge, Lond.; Mr. W. Bryce, Edinburgh; Birkenhead and Wirral Children's Hospital, Birkenhead, Lady Supt. of; Dr. D. Buxton, Lond.; B. J.; Birmingham University Library, Librarian of; Bibliothèque de la Faculté de Médecine de Oporto, Librarian of; Dr. Baily, Cannes; British Medical Association, Lond., Deputy Medical Sec. of; Capt. C. Banks, R.A.M.C.; Capt. O. Berkeley-Hill, I.M.S.; Birmingham University, Secs. of; Messrs. Brady and Martin, Newcastle-on-Tyne; Messrs. Bowes and Bowes, Cambridge; Messrs. Butterworth and Co., Lond.; Messrs. W. H. Bailey and Son, Lond.; Dr. H. W. Bruce, Lond.; Brighton and Sussex Medico-Chirurgical Society, Brighton, Sub Librarian of; Bath Corporation, Town Clerk of.

C.—Dr. H. M. Crake, Calcutta; Mr. J. Cabburn, Lond.; Mr. P. P. Cole, Lond.; Cambridge University; Mr. J. M. Churchfield, Lond.; Chymol Co., Lond.; Capt. L. Colebrook, R.A.M.C (T.); Major R. Coombe, Exeter; Messrs. J. and A. Churchill, Lond.; Messrs. Cassell and Co., Lond.; Messrs. Conlan and Co., Liverpool; Messrs. Clement and Johnson, Lond.; Messrs. G. W. Carnrick Co., New York City; Mr. H. J. Clague, Long Itchington; Dr. H. R. Carter, Lond.; Mr. J. Cantlie, Lond.

D.—Duty and Discipline Movement, Literary Sec. of; Messrs. W. Dawson and Sons, Lond.; Derbyshire Royal Infirmary, Derby, Sec. of; Dr. D. Douglas, Bellshill; Messrs. J. Dickinson and Co, Hemel Hempstead; Dr. R. Donaldson, Reading; Dhrangadra State, Kathiawar, Chief Medical Officer of; Dorland Agency, Lond.; Dr. J. Davison, Bournemouth.

E.—Dr. W. M. Elliott, Glasgow; Edmonton Public Library, Alta., Librarian of; Egyptian Government, Department of General Statistics; E. F. H.; Capt. J. Ewing, R.A.M.C.

F.—Robert Ferber, Ltd., Lond.; Messrs. Fannin and Co., Dublin; Dr. W. M. Fletcher, Lond.; Prof. Frugoni, St. Osvaldo, Udine.

G.—Dr. J. G. Gordon-Munn, Norwich; Mr. J. Galt, Cottingham; Capt. R. P. Garrow, R.A.M.C; Capt. E. R. Grieveson; G. R. B.; Glasgow University, Registrar of; Mr. J. A. Granda, Lima.

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